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STAGE TECHNIQUE IN THE TALKIES

A Sound Engineer Presents Some Interesting Details and Observations Gained in a Varied Experience

By CARL DREHER

Director of Sound Department
R-K-O Studios

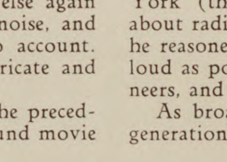
This article, appearing in the current issue of Radio News, reprinted through courtesy of the publishers.

Illustrations by J. Ronan

While the two groups are educating each other much money is lost—and a good many tempers.

WHEN one compares microphone technique on a sound moving picture stage with the corresponding manoeuvres in broadcasting, one notes many close parallels and, also, some salient differences. A microphone is a microphone, but it is one thing to be able to place it where one pleases, in relation to the performers, as in the broadcast studio, and something else again when the business of the play, camera angles, camera noise, and all sorts of dramatic consideration must be taken into account. Movie microphone technique, as a result, is more intricate and requires greater adaptability on the part of the specialists.

It should be acknowledged, however, that without the preceding experience of the broadcast rooms the job of the sound movie technicians would be insuperable. Not only did they learn their craft in broadcasting, but broadcasting taught the artists the amenities without which natural sound reproduction is impossible. It was in broadcasting that the cooperation between the performer and the technician, which is indispensable in this field, was first developed. The artists who first appeared in the radio studios took the idea that they should modify their execution for the sake of the microphone either as a personal affront or as a silly notion to be charitably ignored. I recollect my own experience with one of the great figures of the operatic world some five years ago, when he made his first bow to the radio audience. At the rehearsal he took his stand before the transmitter and sang with prodigious volume, such as he had been accustomed to exhibiting from the Metropolitan stage. The d. c. milliammeters in the microphone circuits did a hootchy-kootchy dance, and the control operators tore their hair. We explained to the gentleman that he was blasting terribly, that in a small room, with almost unlimited electrical amplification ahead, great initial volume was superfluous and injurious, and that better results would be secured if he would tone down his performance. After some snorting and argument in Italian with his manager, the artist graciously consented to make an effort to hold himself down. In the evening, however, he could not be restrained and the undeniable beauty of his voice was largely lost in transmission. Later on we found that an imbecilic scheme of the artist's press agent, probably abetted by similar mentalities on the station staff, was partly responsible for the colossal fortissimos which the great tenor flung against the quaking walls of the studio. It seems that a group of the artist's friends were assembled in Rome to hear him broadcasting in New York (the power was about 750 watts). Little as he knew about radio, he realized that the attempt was a desperate one, and he reasoned that the only chance of getting across was to sing as loud as possible. He therefore dismissed the counsel of the engineers, and did his damndest.



Help!

As broadcasting developed and stood on its own feet, a new generation of artists took the place of those of the older luminaries who had not shown themselves adaptable to the new order. These people developed a microphone technique which experience showed gave the best reproduction in the homes of the listeners. They realized that their reputations and future incomes were in the hands of the engineers, and instead of waiting for the technical people to correct them, they asked them how to do it right in the first place. Some of these artists made, and are making, an imposing lot of money. This intelligence being spread abroad through the musical and dramatic trade papers, a new attitude toward the microphone and its mentors was created in the entertainment profession generally. The happy result is that in the talking movie studios most of the actors are as eager to play to the microphone as to the camera, and the engineers get from them all the co-operation imaginable.

If some of the movie directors are less pliable, it is because they have not yet assimilated the broadcast viewpoint, which is based on the simple fact that the acoustic characteristics of the present-day microphone and its surroundings must be conformed to in the action, if the final product is to be successful. But this goes the other way also—many of the engineers have been slow in adapting themselves to the movie technique which preceded their entrance into the business and will in major degree survive it. Both parties must gain an understanding of technical limitations in photography and sound pick-up, not merely in one of these fields. The

He took his stand before the microphone and sang with prodigious volume.

situation which exists in many studios is that the sound engineers know the limitations of the microphone (even under the best acoustic surroundings which can be provided), while the cameramen and the directors who have been working with the camera men for years know the photographic limitations. The engineers ask for microphone placements which result in impossible camera angles; the directors want to photograph as in the past, and demand miracles in microphone work from the engineers. While the two groups are educating each other a good many tempers — and much money—are being lost.

In such situations the engineer, if he is to perform his task effectively, must be a practical psychologist as well as a sound technician. There are times when he must be firm and even severe. Experience shows that if he quietly accepts an impossible microphone placement, with merely a polite statement to the effect that the sound will not be good, he will be blamed later for the result. The director and the other functionaries will conveniently forget their part in the compromise, and intimate that the engineer just doesn't know his business. In the nature of studio activities, loss of confidence in any technician proceeds rapidly, once the process is started. The sound man must not let it start if he can help it.

The great bogey in the picture business is holdups in production.

Another peculiarity of studio psychology which he must be prepared to meet is that the law of identities does not hold between sound and picture. The law of identities, for the benefit of those who have forgotten their college courses in logic, is the simple proposition that a thing is equal to itself. Twenty minutes, for example, is twenty minutes—but not in a sound studio. There twenty minutes of delay caused by sound equals forty minutes of picture delay. If the sound engineer, with his hundred million-fold energy amplification following the microphone, is stopped for a few minutes by a noise which he cannot locate, a far more serious crime against the studio has been committed than when a camera man interrupts the shooting to have the lights changed. This is unfair, but perfectly understandable. In the first place the sound man is an alien in the studio, during the present period of adjustment, and judgments of him are likely to be more severe. But more than that, when he causes a break in production it is looked on as one more source of delay in a business which was already appalled by its losses resulting from delays. The great bogey in the picture business is hold-ups in production. The actual "takes" occupy a lamentably small portion of the time of the studio. Designing and building sets, rehearsals, placing and shifting of lights, changes in the action of the play, and now, microphone placing and amplifier adjustment, take up most of the time, and the actual photographing and recording which bring in the money are in the proportion, almost, of minutes to hours. And those hours, especially when the cast is ready and waiting, and all the grips and electricians and property men and directors and supervisors and the thirty-seven varieties of assistants with them, cost a dreadful lot of money. Nobody sees a few thousand dollars an hour going down the chute calmly, and the hysteria is at its worst when the sound apparatus is the cause of the loss.

Some delays the sound engineer cannot avoid; if, for example, he finds that with a given microphone placing he is not getting the best results, the action must usually be held up until the transmitters can be shifted. With even the shrewdest technical personnel on the job microphone placing is a matter of cut and try, and sometimes the first try is not good enough. But delays caused by failure of the equipment are intolerable in sound picture work, just as going off the air is in broadcasting. Some such delays will nevertheless occur, just as breaks on the air have not been entirely eliminated by even the best broadcast stations. A microphone becomes noisy, or some electrical disturbance is picked up, or a circuit opens somewhere. The remedy, as far as there is one, is careful testing. The equipment must be gone over each day before production is scheduled to start, from microphones to film, and its performance tested at all the essential frequencies. Voltages and currents must be checked, and any anomalies rectified before the damage is caused rather than afterwards. A good audio oscillator and a complete stock of meters has saved many a sound engineer's professional neck. If trouble, nevertheless, occurs, he must rely on his skill as a diagnostician. Most irregularities have their characteristic sounds, which can be recognized. During spare time they should, in fact, be deliberately produced, and such objects as a leaky condenser microphone, or a lead which meggers below the safety line, or a microphonic tube, have considerable instructional value in this connection.

The subordinate sound technicians should be encouraged to keep accurate logs, and when sound equipment causes a delay the precise loss of time, and the cause, should be entered. Such a record is often of value later, although naturally it is not the matter of primary importance, which is to produce high quality sound negative as fast as possible. The notation comes in handy after studio incidents like one I witnessed, where it was necessary to shift microphone positions, at the cost of about ten minutes. During this interval the director decided that the camera angles were wrong, whereupon the cameras were shifted and the lights changed. This manoeuvre was completed thirty minutes after the sound men had finished their job. Later sound was charged with the loss of forty minutes. The sound engineer protested to the producer and was able to prove by his records and other testimony that he was responsible for only ten minutes out of the forty.

In contrast to this sort of thing one may turn to an article on "Sound Men and Cinematographers Discuss Their Mutual Problems," in the August, 1929, issue of the *American Cinematographer*, the excellent journal published monthly by the American Society of Cinematographers in Hollywood. In the nature of things the camera men and the sound people get in each other's way. Be-

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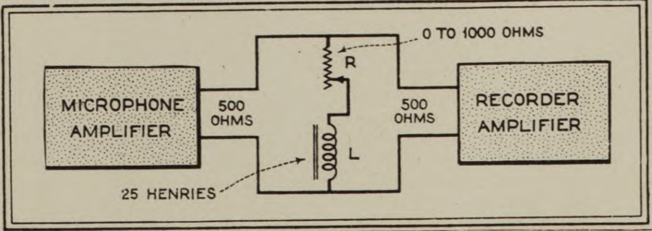

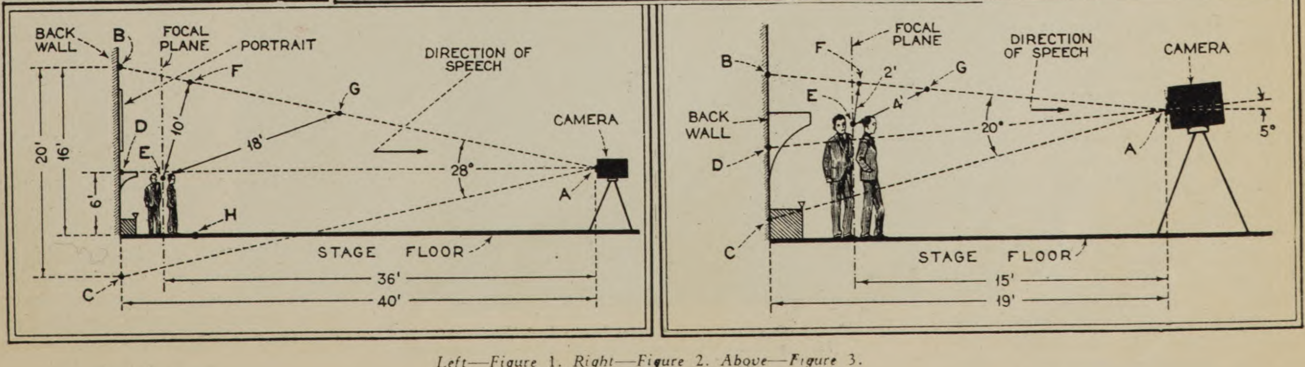

Left—Figure 1. Right—Figure 2. Above—Figure 3.

MULTIPLE EXPOSURE CINEMATOGRAPHY IN SOUND PICTURES

Lap Dissolves Again in Use As Cinematographers Master the Difficulties of Sight and Sound Photography

By WILLIAM STULL, A. S. C.

IT IS HARDLY more than a year since sound pictures took their place as the major part of studio production programs. In that year an enormous amount of progress has been made, alike in the artistic utilization of the new form, and in the technique of its operation. Studio personnel has grown increasingly familiar with the sound device, and this familiarity has resulted in the overcoming of many of the obstacles which the coming of sound was thought to have placed in the path of true screen technique.

An instance of this is the reappearance of such truly cinematographic effects as lap-dissolves and multiple-exposure work. A year ago they were regretfully dropped from the cinematic vocabulary due to the added complication of sound photography. Now they are reappearing, as cinematographers and recorders gain more assured mastery of the new medium.

Probably the first to reappear were the 'fade-out' and 'fade-in'. Screen technique demanded them. As a rule, they have been made chemically; but to cinematographers, chemical fades are rarely satisfactory substitutes for those made directly in the camera. Similarly, recording engineers greatly prefer to control the fades on their sound-tracks themselves. Therefore, in practically all studios, fades are now made directly in the camera and recorder. When recording with the Variable Density process, by means of a glow-lamp, the most satisfactory method has been found to be the gradual removal of the lamp to a distance from the film at which its light is no longer strong enough to affect the emulsion. While this could of course be done mechanically, it is at present done manually; very little practice being required to attain proficiency. When using the light-valve method, two courses are possible. One may either gradually stop down the lens of the recorder, or reduce the amplification from the mixing-panel. Both of these methods are also applicable to the Variable Area processes, while of course the only control possible for the disc system is through the amplifier.

Having mastered the technique of fading in and out in sound, it is not such a great step to combining and overlapping the fades, making a lap-dissolve. Still, it has proven quite an undertaking, as it offers rather more than double the complication and hazard that silent laps entail. None the less, it is a vitally important part of dramatic cinematography, and could not be overlooked; consequently, the majority of the studios are in one way or another accomplishing sight and sound laps with increasing frequency. Probably the easiest way of getting the desired effect is through the use of the optical printer and the making of duplicate negatives. This is, indeed, the general practice in the studios using disc recording exclusively. But dupes; unless made with a skill and care almost never found in the rush of commercial production, seriously detract from the quality of both picture and sound, and are naturally avoided wherever possible. A second method is to allow the picture to lap quite as though it were a silent film, while the sound merely fades in and out with unusual rapidity; for instance, if the complete lap were to run, say, eight feet, the sound would fade out in four, being immediately faded in on the next scene, also in four feet.

But this is so slightly removed from true lap-dissolving that the added trouble is negligible. Therefore, in most cases, true lap-dissolves are returning to favor in preference to other makeshift methods.

When using the Variable Density systems with glow-lamp apparatus, the procedure, as is the case in fades, is to withdraw the lamp from the recorder. Then the several films are wound back to the marked starting-point of the scene, and run forward, with shutters closed and glow-lamp withdrawn, to the point at which the dissolve was started, and the fade in is made in the usual manner. As a matter of actual practice, however, it has been found necessary to rewind only to the start of the fadeout, plus the footage necessary to regain speed—usually twenty feet. The writer recently spoke with a cinematographer who had on the same day made by this method a sequence involving four such lap-dissolves, without a single failure in the course of a half-dozen 'takes'. He had found it necessary, however, to recognize the human element in his problem to the extent of allowing for the inevitable lag in the recorder's response; for instance, if the fade were to come at the 40-foot mark, he would signal the recorder when the indicator read 38-feet, and then start his own fade.

When recording with the light-valve, the same general technique is followed, save that the sound is faded in or out by either the optical or electrical methods earlier mentioned. In the Variable Area system, the same general procedure may be followed, but there is an additional possibility, as well. The entire optical assembly may be gradually decentred with respect to the film, gradually reducing the magnitude of the serrated edges of the sound-track to their mean level. If this be done, moving the assembly to the left, for instance, and at the same time shielding the right-hand side of the track from exposure, the other half of the dissolve may be effected by similarly moving the assembly in from the right, and stopping it when centred. So far as is known, this latter possibility has not as yet been tried in actual production, though it is considered quite feasible from the theoretical standpoint.

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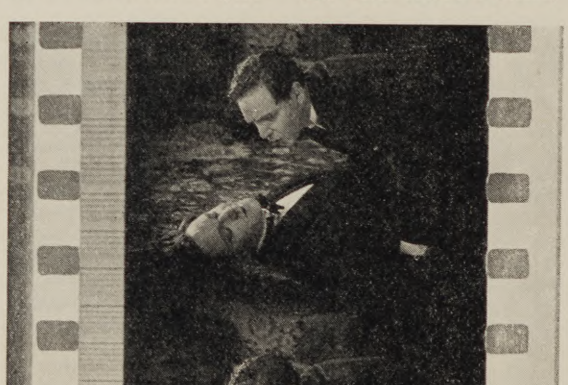


Double exposure of actor and voice in the Fox Movietone picture, "Masquerade." Note sound track at left.—Photographed by Charles Clarke, A. S. C.

SOUND PICTURES THE SUCCESSFUL PRODUCTION OF ILLUSION

Extract from a Lecture Before the Sound Class of the Academy of Motion Picture Arts and Sciences

By WESLEY C. MILLER, M. S., E. E.
Chief Transmission Engineer, M-G-M Studios

This is the first of a series of articles on sound problems which Mr. Miller has prepared and which will appear in The American Cinematographer. Editor's Note.

WE AIM to produce pictures which will be successful when run in a large number of theatres. This success is measured in dollars and cents but back of this measure there is the necessity for a careful analysis of the many factors—creative and technical—which have gone into the work. Most of us believe that, generally speaking, the story told by a picture contributes largely to the reception which it receives. This is tempered by the treatment which is given in the direction, and especially in the editing. The more technical factors of photography and sound naturally are of importance, but greater perfection of them has the effect of merely enhancing the value of an otherwise good picture. Good photography or sound have rarely salvaged a poor picture. On the other hand, poor quality of either, or both, has made many an otherwise good picture mediocre or poor as presented to the audience. If such degradation of a product is possible, and we all know that it is, it is well worth our while to find the causes of trouble and the possible methods of relief.

A great deal could be said on the subject of the story itself and the method of presenting it. Naturally, each type of story lends itself to a different treatment. Before the advent of sound, the motion picture art had reached the point where a great portion of the tremendous appeal of the picture came from the fluidity of motion of the action. The ability to cut from place to place, to recognize no limits of time or space, had made it possible to play upon the imagination of the audience to the point where they were almost in the scenes depicted before them on the screen. This done silently or with suitable music left their minds undisturbed by anything but the picture, which, if at all good, could completely carry them away. Along with it all, however, it was still quite possible to talk or move around without losing enough of the sense of the picture to make it uninteresting.

Sound immediately introduced a complication which is largely psychological. If much of the story is told by the spoken dialogue it becomes practically imperative to maintain silence and to pay strict attention to every word. This demands concentration to a degree which is often not relished by an audience which demands a method of recreation which permits more relaxation. It will readily be granted that the motion picture audience, taken by and large, is definitely different from the one which attends the legitimate stage or even the musical comedy. These people go with the distinct knowledge that they will have to pay attention to every detail and will even have to strain a bit to get it all.

The adaptation of our new medium to the audience is a problem which must be answered in two ways. In the first place the audience will to some extent fall into the habit of learning how to enjoy our products. Whether they will do it as enthusiastically as they used to no one knows. Secondly, the producers have the artistic and technical analysis to make of what will best work out under these new conditions. This will not be the filming of stage presentations per se nor the attempt to merely introduce sound or dialogue into a picture handled on a silent basis. It is evolving now, as we know, and will result in a combination of the arts of each of these branches which will attain success never dreamed of for any one alone.

We perhaps dislike admitting it in public, but it seems to be a fact that the most natural appearing results obtained in this business are quite apt to be the result of intelligent and studied artifices. Some of these are pure genius. This condition has not come about accidentally, but has as its cause the limitations which have been found and recognized in the various devices now available for production and reproduction. These limitations will become less severe as time goes on, but to some extent will always exist. We create artifically the effects of stereoscopic photography, we exaggerate perspective or we attract attention to some person or object through the device of the close up. Each time as we do this we keep in mind the probable effect which is to be produced in the theatre.

With sound our problem is identical. The very best thing we can hope to do is to produce rather imperfectly the illusion that the real thing is before us. If we can do this well enough to hold the auditor and to make him forget even temporarily that he is not seeing and hearing the original, we have gained our end.

Suppose we review the factors which affect us. If we have before us on the stage a person singing or talking tne very best we can hope to do is to get most of what is going on. Unless we sit in the first few rows we can practically never get it all. Fortunately our various faculties all work together in such a way that we piece together all of the various bits which we see and hear and thus gain an understanding of what is going on. If now we enlarge that which is on the stage to the size prevalent on the screen, and if we similarly amplify the sound to just nicely fit this enlargement, we have made an important step in assisting both our sight and hearing in keeping track of the progress of the act. There is an important provision in this, however. The amplifiaction of the sound must be just enough to fit the picture size. Probably the best way to express this is to say that any combination of picture and sound must be so proportioned that the latter sounds natural

(Cont'd on Page 20)

A Beauty Spot in Utah—Photographed by Dan Clark, A. S. C.

MACHINE FOR CUTTING MASTER DISC RECORDS

A Paper Presented at the May, 1929, Meeting of the Society of Motion Picture Engineers

By L. A. ELMER AND D. G. BLATTNER
Bell Telephone Laboratories, Inc., New York

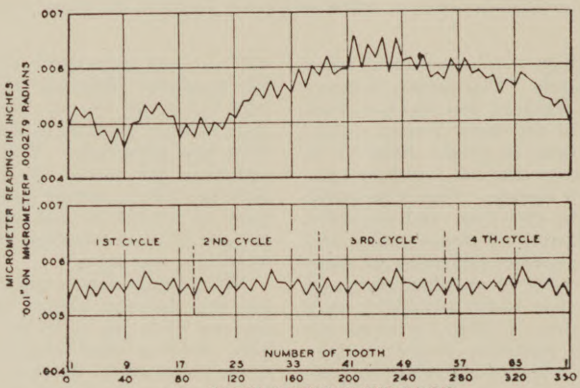


Figure 1

THE machine used in recording sounds on phonograph discs synchronously with associated pictures consists essentially of a turntable, bearing the "wax" and rotated by a synchronous motor of constant speed, and an electrically driven stylus cutting the record. In the design of this machine the primary aim is to ensure that the record is both faithful to the original sounds and synchronous with the pictures. Fidelity in the performance of the stylus would be vitiated by departures from uniformity in the speed of the turntable while sounds were being recorded or reproduced. Although a constant speed motor is used, its value would be destroyed if the machinery transmitting the drive motor to turntable were not equally free of velocity variations. Thus the problem of fidelity involves not only the motor and the stylus but all the moving parts of the machine.

Even were it possible to connect the motor directly to the turntable, casual variations in the speed would arise, from varying frictional loads on the turntable and bearings. But direct connection is unsatisfactory. Because the turntable must operate at a lower speed than the motor (one thirty-sixth of that speed), reducing gears must intervene. In the actual apparatus, the motor drives (through a horizontal coupling) a worm engaging a worm wheel which drives (through a vertical coupling) the shaft to which the turntable is attached.

It is cyclic speed-change that must be guarded against in this mechanism; all such changes with frequencies from about one-half cycle per second up to the higher limit of audibility are to be avoided. Speed changes at audible frequencies introduce extraneous sounds into the records, and speed changes at frequencies below the audible range produce changes in pitch. There are in general two points of origin for these variations; the turntable and its bearings, and the gears. Speed-changing variations in load on turntable and bearings are most likely to have the frequency of the rotation of the turntable (a little more than one-half cycle per second). From the gears three sorts of variations arise; those accountable to inaccuracies in the spacing of the teeth (Figure 1), to errors in the shape of the teeth, and to the successive shifts of driving load from tooth to tooth. Together, these may occasion variations with quite a range of frequencies.

The extent to which these variations are permissible is determined, for low-frequency changes, by the smallest change in pitch the ear will notice when pitch-variation is continuous. It appears that, when a pure tone is projected by a loud speaker of high quality, the ear can detect variations in its pitch which exceed one-tenth per cent of its frequency. This sets a severe requirement for constancy of rotation.

It is, furthermore, an overall requirement, for it applies to differences between the original and reproduced sound; and both a recording and a reproducing machine intervene between these sounds. Since both operate at the same speed, and since there is a high probability that the ultimate record will be lined up on the reproducer correspondingly to the "wax" on the recorder, variations in the speeds of the two are likely to be additive in their effects upon sound pitch. The sum of the variations permitted in the two, therefore must not be greater than the total permissible variation for the system as a whole. Since the more its velocity characteristics are made constant the more the apparatus costs, it is economical to be stringent in requirements for constancy in the recorder, of which comparatively few are manufactured, the more lenient in those requirements in the more numerous reproducers. An economical division between the two machines of the total allowable error appears to be in the ratio of one to four. The demand for constancy thus placed upon the recorder is far higher than can be met by gears and bearings of even the most careful construction. It is a demand which can be filled only by special means.

A motion of this sort can be treated as a uniform rotation on which a small reciprocal motion is superposed. The reciprocal component can be suppressed, therefore, by a vibration-absorber rotating as a unit with the entire apparatus and absorbing the relative reciprocal motion between its parts. This absorber, or

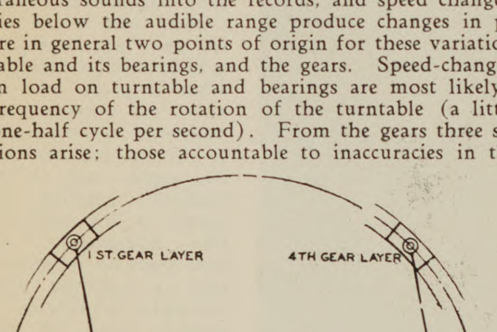
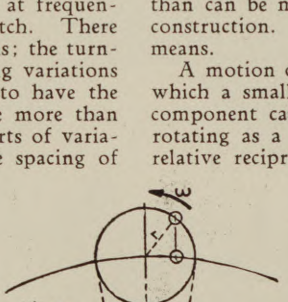


Figure 2



ω_A = Av. Turntable Vel.

$\omega_A + \frac{\omega_r}{R}$ Max. Turntable Vel.

$\omega_A - \frac{\omega_r}{R}$ Min. Turntable Vel.

ω = Angular Eelocity of Vibration $= 2\pi f$.

$2\frac{\omega_r}{R}$ = Velocity Varation

$200\frac{\omega_r}{\omega_A}$ = Velocity Var. in per cent

$$200\frac{\omega_r}{\omega_A R} = 200\frac{\omega}{\omega_A}\theta$$

θ = Amplitude in Radians

When $\frac{\omega}{\omega_A} = 1$, $200\frac{\omega_r}{\omega_A R} = 200\,\theta$

Figure 3

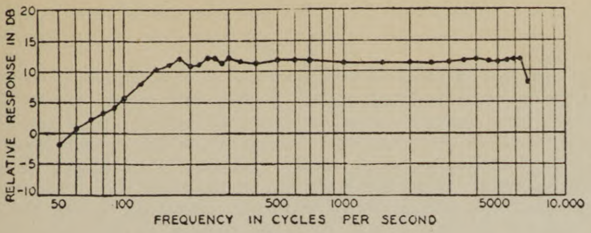


Figure 4

"filter", can be made of masses, springs, and dissipative plastics, suitably combined in accordance with dynamic theory.

Such a filter, designed in Bell Telephone Laboratories, is incorporated in the Western Electric Company's commercial disc-recording apparatus. It uses coil-springs as its capacitances, viscous oil for its resistances, and the masses of its moving parts as its inductances. The great width of the frequency band to be attenuated, and the plurality of the sources of the varying force, considerably complicate the problem of determining what values of stiffness, weight, and dissipating ability should be used. For example, variations due to gear inaccuracies are most readily absorbed by very flexible springs, whereas disturbances due to varying loads are best prevented from affecting turntable speed by the use of stiff springs. The filter finally designed embodies a compromise between these conflicting demands. Its general construction is such that the worm-driven gear drives the turntable shaft through the linearly flexible springs, and relative motion of the gear and shaft is damped by the oil.

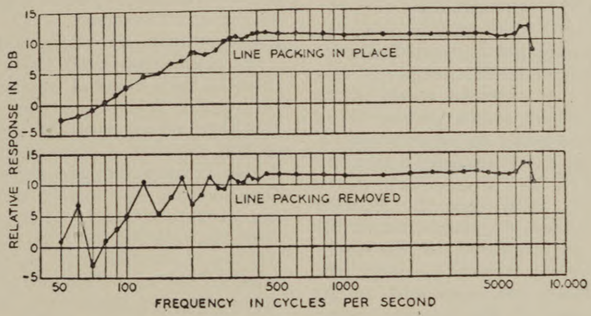


Figure 5

The gear is made in four layers. These layers are clamped together when the teeth are cut, and each layer is afterwards rotated ninety degrees relative to the adjacent layer. All are finally mounted, in engagement with the worn wheel, so that each can move independently of its companions. To each layer two cross-braced posts are rigidly attached, from the tops of which springs lead to lugs on a plate fastened to the turntable shaft. Thus each layer of the gear independently drives the shaft through two springs. It is apparent that the offset four-layer structure of the gear divides by four the amplitudes of the disturbances caused by inaccuracies in the teeth, since at any one time, each affects but one of the four sets of springs. This structure also multiplies by four the frequencies with which these disturbances occur since each inaccuracy in cutting is made to occur once for every 90 degrees, instead of once for every 360 degrees, of rotation. This higher frequency is far more readily absorbed by the filter than the lower would be.

The oil connection between gear and turntable shaft is effected by permitting the layer-gear to rotate a vane-bearing oil-filled cup, into which dip vanes attached to the turntable shaft. The mechanism through which the gear drives the cup is in this case rigid rather than elastic, but is again one whereby the effect of a gear irregularity upon the cup is quartered in amplitude and quadrupled in frequency. This mechanism is a system of links independently driven by each of the layers of gear so as jointly to rotate the cup with the average velocity. To each layer, again through the perpendicular posts, is attached a link (Figure 2). The members of one and the other pair of these links are flexibly joined by cross-links, to the center of each of which is pivoted one end of the bell-crank. The other ends of these two bell-cranks are in turn flexibly joined by a third cross-link, to whose center the member which drives the cup is attached. It is apparent that the motion of the center of each cross-link is the average of the motions of its two ends. Each of the first two cross-links, therefore, averages the motions of two of the gear-layers, and the third cross-link averages the motions of the first two cross-links, driving the oil cup with the average motion of all four gear-layers.

Because the deflections with which this apparatus is expected to operate are very small, it is essential that no motion be lost by "blacklash" in pivots. For this reason, and to minimize pivotal friction, flat reed-springs are used for all joints. Since the linkage cannot be constructed in a single horizontal plane but must be built in several planes, it is subject to warping forces which tend to produce many undesired motions. To avoid these, the linkage is extensively braced.

In the development of this filter, reliance upon theory had to be supplemented by measurements of the effectiveness of various models. Since smooth rotation of the turntable was in view, fluctuation in turntable speed was the performance to be directly measured. This was accomplished stroboscopically. On the rim of the turntable 216 accurately spaced grooves were cut. A disc, with six radical slots, was connected by a rigid drive to the shafts of the synchronous motor. The disc was so placed that the grooves on the rotating turntable could be observed one by one by a microscope looking through the slots in the rotating disc. Observed through this apparatus, the groove on the edge of the rim appears to stand still when the speed of the turntable is exactly one thirty-sixth the speed of the motor. A small error in turntable speed causes the image of the groove to change position momentarily. The amount of this shift can be read in thousandths of an inch on a filar micrometer placed in the eye-piece of the microscope. From this reading the per cent velocity variation can be calculated (Figure 3).

The model finally developed drives the turntable with remarkable constancy. Of the velocity variations from the two major sources of error—form varying loads, at one cycle per revolution, and from varying gear-spacing, at four cycles per revolution—the former has been reduced to 0.04 per cent and the latter to a point below the limit measurement. Supplemented by suitably modeled drives for reproducing machines, recording drives of this type provide ample insurance against maltreatment of sounds by driving machinery.

Discussion Pertaining to D-85264 Recorder and 6-A Reproducer

The purpose of the turntable and other gear described is of course only the means to an end. They are essential in order that the recording instruments may perform their intended function.

The recorder and reproducer, the instruments referred to have been described in previous literature but further discussion in regard to certain features of design and usage may be of interest at this time.

Recorder

The technical features of the recorder will be considered only in so far as is necessary to bring out the points under discussion.

For present purposes, the transmission system used in disc recording can be described as a transmitter directly connected to a recorder. In such a case, the transmitter (microphone and other transmitting apparatus) used for picking up the sound, may be considered as a constant resistance device which, when subjected to sound pressure waves, generates an alternating voltage proportional in magnitude to the sound pressure and of the same frequency; and the recorder may be considered as a device actuated by such a transmitter to produce an engraving in a wax, the wave form of the engraving having the same frequency as the transmitter voltage.

It is obvious that in such a system only a portion of the transmitter voltage is effective to drive the recorder. It is necessary

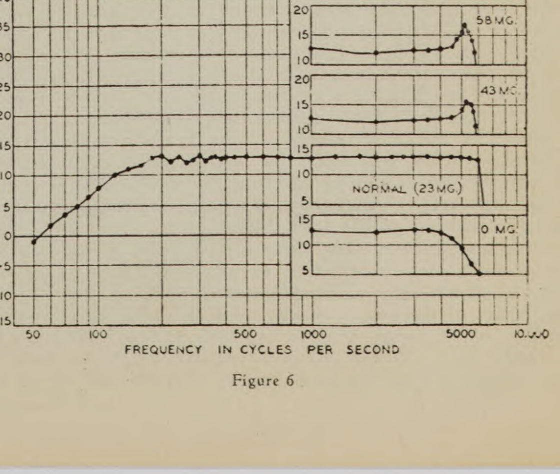


Figure 6

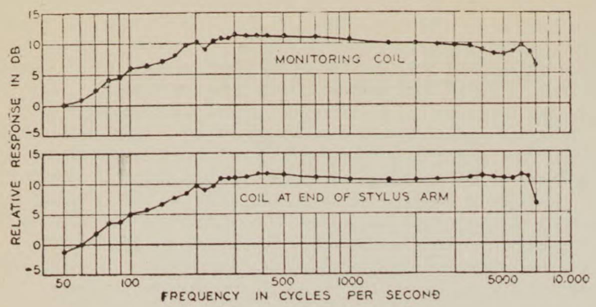


Figure 7

that the recorder should produce an engraving that bears some simple relation to the transmitter voltage, since this voltage is proportional to the sound pressure. With a perfect recording and reproducing system, the sound power reproduced from the record would be proportional to the sound power available for recording; and if the air load on the sound reproducer (or loud speaker) is of the constant resistance type, then the simple relation between the performance of the recorder and the transmitter voltage referred to above may be expressed as

$$V = K\upsilon.$$

Where V is the transmitter voltage υ is the vibrational velociay (2ñfa) of the engraving and K is a constant. Except as other considerations make it necessary to depart from such a relation, this equation then may be taken as the required performance characteristic of the Western Electric D-85264 type recorder.

It will be obvious from equation (1) that the factor K can have any value and still fulfill the requirements as to perfection of performance; the only further requirement in this respect is that a suitable value of υ shall result from the combined action of the transmitter and recorder to make the subject matter of the record stand out sufficiently above the incidental noise. In other words, K merely indicates the combined transmitter and recorder sensitivity required for a given sound loudness available for recording. If the transmitter sensitivity can be varied at will, then the recorder sensitivity can be allowed to vary, provided the magnitude of the variation does not impose additional requirements on the transmitter. In the case of the Western Electric recording system, the 394 transmitter and associated amplifiers are considered as the transmitter. There is, therefore, no need of the recorders being alike in sensitivity, and as a matter of economy in manufacture, no considerable effort is made to have them so. In fairness to the recorder, however, it might be said that the magnitude of the magnitude of the manufacturing variations permitted is so small that the device would have been considered uncommercial a few years ago.

From what has been said, it probably has occured to the reader that variation in sensitivity if the recorder product is of less importance than variation in shape of sensitivity characterstic for various frequencies. It is distinctly desirable that the same quality of reproduction be obtained from records cut by different instruments. To this end, a variation in shape of the sensitivity characteristic of any recorder, throughout the frequency band of interest in excess of ± 1 db^{b}, is not permitted; whereas, as variation of ± 3 db between different recorders at any particular frequency is considered satisfactory. Figure 4 shows a typical sensitivity characteristic of the D-85264 recorder.

In order to obtain such a degree of precision in sensitivity of recorders manufactured by the Western Electric Company, it has been found necessary to go to some considerable pains in assembly and adjustment. For instance, the rubber line must be carefully chosen as to mechanical properties and must be carefully packed in the housing. Once properly assembled and adjusted, however, experience with a considerable number of recorders now in service indicates that further attention is rarely necessary, provided the instruments are handled with reasonable care. Proper selection of the rubber line and proper assembly and adjustment are determined by sensitivity measurements at various frequencies rather than by visual observation, and under no consideration is it recommended that adjustments or repairs affecting the rubber line be attempted in the field. Fig 5 shows the effect upon sensitivity caused by improper packing of the rubber line.

A further point in this connection has to do with the stylus. The recorder was designed to be used with an average cutting point weighing about 25 milligrams. It is obvious that if the point is not of the proper weight or if it is not mounted n proper relation to the stylus arm, a typical response curve cannot be obtained. Fig. 6 shows the effect of the weight of the recorder point upon the shape of the sensitivity characteristic of the device. The proper position of the stylus point is one for which the tip extends beyond the end of the stylus arm from 1/16 to 1/10 of an inch.

In order to facilitate determination of the sensitivity of the recorder at various frequencies, a new calibrating system has recently been designed which replaces the optical apparatus previously used for this purpose. The use of the new system involves only such technique as is already familiar to amplifier maintenance people. The scheme consists in replacing the stylus point by a small coil of equal effective mass, operating in the gap of the magnet in such a way that the motion of the stylus arm induces a voltage in the coil proportional to the velocity of the arm. The technique of making a response determination consists in comparing the coil voltage to the transmitter voltage in much the same way as in the measurement of amplifier sensitivity.

In connection with the calibration of recorders it is important to know something as to the purity of the wave form of the groove cut by the recorder. A considerable harmonic content in the wave form might defeat the whole purpose of the calibration. In consideration of this point, it is to be expected that in a magnetic system, in which all the reluctance is concentrated at the air-gap and in which a preponderance of the total armature flux results from the steady magnetomotive force, a condition of saturation would result when the gap is momentarily reduced a sufficient amount. In the Western Electric recorder, considerations as to the flux density in the gap and premeability of iron lead to the conclusion that the harmonic generation would be small for stylus displacements of as much as 10 mils or more, whereas the maximum displacement permissible from the standpoint of the record is only about 2 mils. Experimental data indicates that when driven at a frequency of 50 cycles and an amplitude of 4.6 mils the harmonics are of the order of 30 db below the fundamental.

In connection with the D-85264 recorder, a new feature has recently been worked out by means of which it is now possible to monitor from the stylus rather than from the bus bars of the amplifier which feed the recorder. As pointed out, the response of the recorder at low frequencies is somewhat less than at the higher frequencies, and therefore the character of the monitoring reproduction by the two methods will be different. By monitoring on the stylus arm, it is now possible to hear, when recording, what the finished hard record, made from the wax being cut, will be like. It is felt that monitoring in this way should make it possible to more accurately judge the balance of the subject matter and so result in a more constant product and in saving of time and expense. The monitoring device consists of a coil and magnet similar in construction to those described for the response measuring system, but differing, in that the monitoring apparatus is supplied to the stylus arm at a point about midway of its length. In applying the monitoring device to a recorder it is necessary to alter the arm somewhat in sectional area and length in order to obtain the proper overall effective mass; but the effect of the alternation upon sensitivity is negligible. Fig. 7 shows a response characteristic of such a recorder, when measured in the usual manner and also when measured by means of the monitoring device. It will be obvious that the

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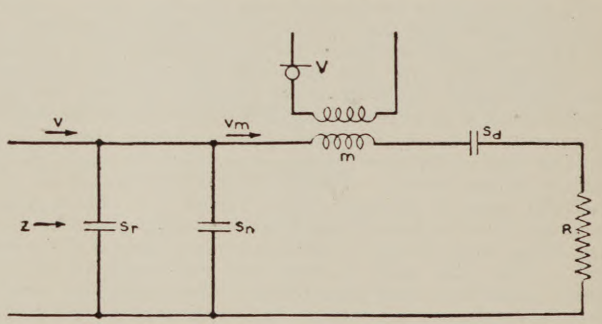


V = GROOVE ANGULAR VELOCITY
V_m = ARMATURE VELOCITY
V_m / V = CONSTANT
R = DAMPING RESISTANCE
S_d = DIAPHRAGM STIFFNESS
S_r = STIFFNESS OF WAX
S_n = STIFFNESS OF NEEDLE

$$S = \frac{S_r S_n}{S_r + S_n}$$

ALL VALUES EFFECTIVE AT GROOVE

Figure 8

MULTICOLOR INTRODUCES IMPROVED COLOR FILM

New Rainbow Negative Promises Color on a Black-and-White Basis

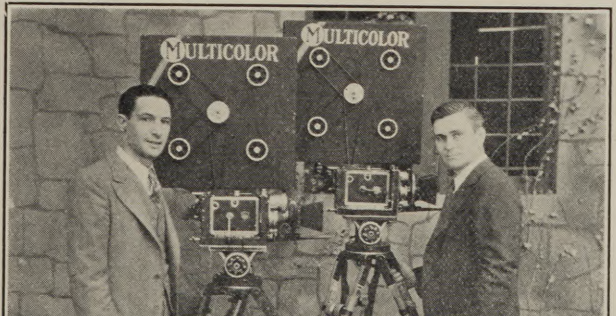
By WILLIAM STULL, A. S. C.

ALTHOUGH it sometimes seems as though every innovation in picture-making is hailed as the most significant development of its time, there can be little doubt but that right now the increasing use of natural color cinematography is the paramount question. Sound has become an accepted part of production, and wide film and television are still beyond the horizon; but color is unassailably the topic of the hour. It is here to stay, for audiences everywhere are demanding it as the final touch needed to give life to the talking screen. Therefore screen technicians everywhere are taking a profound interest in everything calculated to bring color cinematography into equality with monochrome as a production process.

In view of such a condition, the very recent introduction of the new Multicolor *Rainbow Negative* is of far-reaching importance, for it brings an already highly perfected process into exact production equality with existing monochrome practice. It obviates the use of special cameras or additional lighting. In short, it attains the goal for which technicians have striven since the birth of the industry—*perfect color, on a black-and-white production basis.*

While the Multicolor process itself is so well known in Hollywood as to make a detailed description seem unnecessary here, it may be well to digress for the benefit of readers located elsewhere. Multicolor is at present a two-color, subtractive process which may be employed in any standard motion picture camera using demountable outside magazines. Aside from the use of a special double magazine, and a slight adjustment of the film-gate, there is absolutely no alteration to the camera. The prints may be projected in any standard projector. The secret of the process is its double negative which serves at once as film and filter.

Instead of securing the two necessary color-separation negatives by the use of prisms or rotary filters, Multicolor uses two films, which are exposed together, with their emulsion surfaces in contact. The front negative records the blue-green components of the scene, and has incorporated in the outer surface of its emulsion an orange-red dye which is photographically equivalent to the No. 23-A Wratten filter, and acts as such for the rear film, which is practically a standard Panchromatic, and records the orange-red components only. Since no prisms are used, the negative images are naturally in perfect register, and can be made critically sharp. Since they are made simultaneously, there can be no 'fringing.' The laboratory treatment of these twin negatives is exactly identical to that of black-and-white negatives. The prints are made on a special, double-coated positive stock. This has an emulsion coated on either side, in each emulsion being also a yellow dye to prevent the fogging of the opposite print. The print is developed in the normal manner, and the two sides are colored, one orange-red, and the other blue-green. The actual toning process used is an ingenious combination of chemical and dye-toning, selectively coloring the respective images. Since the print is not made by dyestamping, and since the original negatives can be made perfectly sharp, a Multicolor print can be made as critically sharp as could be desired. When colored and dried, the print is carefully varnished, and is thereafter ready for duty. This varnishing process is of the utmost importance, for it not only protects the emulsions, greatly increasing the useful life of the print, but also protects the sound track from the dirt, scratches, and abrasions which so frequently ruin the sound far ahead of the picture.



Ross Fisher, A. S. C., and William Williams

In this printing process, an amazing amount of control can be exerted over the qualities of the finished picture. Not only can the overall density of the print be varied, as with black-and-white, but the color balance as well. While, obviously, there is only *one* "right" balance of color for any given scene, in case of need the balance can be artificially altered to fit the mood; an increase of the red print tending to warm the scene up, and an increase in the blue to cool it.

The new *Rainbow Negative* does not alter any of these processes, but serves to improve the color rendition very noticeably, and increases the overall sensitivity of the process to exact equality with black-and-white. This makes it possible to handle Multicolor in production in exactly the same way as black-and-white. *Anything that is possible in monochrome is equally possible in Multicolor with no other change than the use of Multicolor films and the adjustment of the camera gate to accommodate the two films.* No additional lighting is required, nor any special arrangements: every lighting effect used in normal production can be used unchanged in Multicolor. Extreme high-key and low-key lightings can be used exactly as in monochrome, as can every imaginable trick of artistic camerawork, including glass shots and front miniatures. In addition, by the use of colored gelatines on the lights, an almost unlimited range of absolutely new artistic effects can be produced.

The writer has seen a number of such shots, the beauty of which so far transcended anything heretofore accomplished in either monochrome or color, as to convince him that an entirely new field for artistic cinematography has been discovered. One scene in particular is memorable: representing a medieval prison cell, and photographed in extreme low key, the interplay of the cold, blue moonlight shining through a barred window upon a beautiful woman within, and the mellow, golden glow of the candle-light from within the room was without doubt one of the most strikingly beautiful scenes ever put on the screen—and one which would be impossible by any other method. Closeups, made either with or without a diffusion-disc, were so startlingly natural that it was hard to believe one was looking at mere colored shadows.

The extreme latitude of the process was well demonstrated by some scenes taken late in the afternoon on an extremely shady street-set, but in which the shadows were full of detail, and the highlights none the less absolutely natural. Another scene, made in the desert, pamming around from a very flat front-lighting to an almost complete back-light, showed even less change of density than monochrome would under the same circumstances. But the

(Continued on Page 23)

As the Editor Sees It

Merry Christmas!

AS THIS edition goes to press Christmas is rapidly approaching and little children are, in their childish scrawls, writing to Santa and are anxiously waiting Christmas morning when they can rush to the tree and open their packages and fill the homes with shouts of glee.

A beautiful day is Christmas—the birthday of Jesus Christ, our Lord. For most of us it will be a happy day this year. But, how about those others who, weighted down by poverty and sickness, will awaken Christmas morning to just another day of suffering, perhaps hunger?

How many of us will stop in our own selfish, mad rush to give those people a kindly thought? How many of us will remember that there are thousands of little children with broken hearts and empty stockings, perhaps empty stomachs.

Throughout the world there are wonderful organizations and groups of workers who are now raising funds with which to help make Christmas happy for these children. Have *you* given *your* contribution to such a worthy cause? If you have not, may I suggest that you hurry now and send your check to whatever group is handling the poor in your locality. Jesus gave his life for us. Surely we can give something, if only a dollar, to make some child's tears turn to laughter on Christmas morning.

Years ago this writer, then on the staff of the *Boston Post,* worked several weeks on the Post Santa Claus staff. All night on the night before Christmas we delivered packages to the squalid homes of the poor in Boston. Daylight came and we were still at it.

Shortly after three o'clock on Christmas afternoon I climbed the dark stairs of a tenement in the north end to deliver my last package. As I entered the one room those people called home—well description fails me. Three little half-clad children clinging to their mother's skirt, brushed away the tears and rushed at me as though I had come from God.

"I told you Santa would come," sobbed the mother. Perhaps most of us would be less selfish if we could all step into homes like that. Perhaps all of us would lend a helping hand and Christmas might be a bit more cheerful.—H. H.

Pictures as a Business

SOME idea of the enormity of the motion picture business, and its tremendous growth may be gained from the remarks of Will Hays made in New York recently. The figures are positively staggering when you realize that the industry is so young.

Capital invested in the business is now $2,500,000,000; 150,000,000 feet of negative film used annually; 325,000 persons employed; 1,500,000,000 feet of positive film used annually.

And to think that only a few years ago the business was a nickelodeon affair!

The Stock Market

THE stock market crash is over, we hope; and thousands of men who threw caution to the winds have had their fingers burned. Thousands of homes have been made sad for Christmas because men still believe they can rush into the greatest gambling Casino in the world and win out over experienced men.

For some it has probably been a real lesson. Others will never learn, but will dash back as soon as they can gather together sufficient funds—and get burned again.

Human nature is peculiar. Men who know that money wisely invested in mortgages, sound business, good bonds or in outright ownership of excellent stocks eagerly lay this money down on a margin basis and hope against hope that prices already far above reason will go higher. A paper profit will be in their hands but they become insane with the greed inspired by getting something for nothing with the result—"wiped out." Some day they may learn to follow in the footsteps of the insurance companies and take a legitmate profit on a sound and safe investment.

Multicolor

WITH practically no tooting of publicity trumpets, Multicolor has been very quietly and effectively forging ahead in recent months until today it stands forth as a really important factor in the motion picture field of color. It is now a process that will, without doubt, wield a big influence in the industry, for it has passed the experimental stage and is meeting the tests of a critical industry unfailingly.

The progress of this color process has been truly remarkable. Some of the things accomplished are feats any color process owner should be proud of. For example, high speed pictures in natural colors have been made with startling effectiveness. In the matter of lights, recent tests made by the Multicolor officials revealed the fact that using first 500 amps, then 800 amps, and then 1300 amps, equally fine results were obtained. No great flood of light was necessary.

Disraeli

SOME idea as to the possibilities in talking pictures may be gained from Warner Brother's magnificent picture, "Disraeli." Here is a real talking picture. A picture that has no court-room or back-stage scenes; a picture that is an example of what can be accomplished if a real effort is made to combine genius in story, cinematography, sound and acting.

George Arliss, always wonderful on the stage, is more wonderful on the screen in this splendid picture. Truly, one cannot imagine this picture in a silent version. It is one that needs the voice of a man like Arliss, and he uses that voice in a way that should make this one of the outstanding pictures of the year.

WELL NEIGHBOR LOOKS LIKE— YOUR GOING TO HAVE A 1930 BUMPER CROP
YOU AIN'T SEEN NOTHIN' YET— FOR EVERY ONE'S A FOUR-LEAF CLOVER
ASC
GLENN R KERSHNER A.S.C.

Who says,

"There Ain't No Santa Claus?"

"...Sez You!"
"...Sez I!"

"Oh! Yeah?"

How about

E·A·S·T·M·A·N

PANCHROMATIC NEGATIVE

TYPE TWO

J. E. BRULATOUR, Inc.

LONG ISLAND CITY NEW YORK HOLLYWOOD

TALKING FOR HEALTH

Talking Pictures Have Already Taken Their Place In the Battle to Aid Humanity

By THEO. H. SIERKS
Division of Health Education, Los Angeles County Health Department

"GOO-SKLIMP, Yimmy 'ike wa-wa," large splashes accompany this little speech.

No, it is not the 1930 Wampas starlets being featured in a new talkie, it is just little Jimmy performing before the motion picture camera and sound instruments as a demonstration of the proper method of being bathed in order to grow up to be a healthy speciman of manhood.

The first public health talkie, recently filmed at the new East Side Health Center of the Los Angeles County Health Department, promises to be a remarkable success as a method for the presentation of health education to the public in an interesting and an entertaining manner.

A short talk by an experienced nurse, an enlightening demonstration of proper diets by a trained nutritionist, some valuable pointers on the maintenance of good health by a child hygiene physician, and the modern mother may receive first hand health instruction on the silver screen from reliable sources in a manner designed even more for entertainment than for education. This is the new plan of the public health program of Los Angeles County, California, the home of the motion picture industry and of the largest county health department in the United States.

It is because of the wide territory covered and the large population served that the county has resorted to the products of the film industry in its endeavor to make "health" the password in Southern California. Talkies promise to popularize public health by developing the human interest appeal with the result that health will become a habit. Human interest in public health has not been lacking; it has lain dormant for centuries, waiting for some method of presentation to the people.

Twenty-five robust youngsters from nine to eighteen months of age in individual porcelain tubs splashed merrily to the tune of their own bathroom ballads during the outdoor bathing scene staged in the court of the East Side Health Center, little realizing that their every sound and motion was being accurately recorded by "mike" and lens, later to be heard and viewed in distant showhouses throughout the United States, Canada, and possibly Europe. A nurse, demonstrating with a live model, showed the correct technique in keeping the little bodies cleanly and healthy. Mothers stood behind their infants and followed each direction given by the skilled instructor. The class is ordinarily held indoors but warm weather often makes it more enjoyable in the open air.

Checking weight and height

Cameraman, sound technician, and director of the Hearst Metrotone Newsreel agree that the necessary clowning, gesticulations, and facial contortions for the benefit of the temperamental little actors and actresses might make a passable silent comedy in itself. This outfit has filmed the world's most renowned personages but it expresses the opinion that never before was tact and diplomacy so necessary to the success of a newsreel. Mary Anne wanted to eat her soap; Jacky wanted to drink his bath water; Buster had an undeniable desire to crank the camera himself; Doris would like to chew a while on the wash rag; Dorothy Jeanne wanted the gold-piece on the director's watch chain; and Junior just wanted to splash everyone, including the camera during the close-ups. Despite the wide variety of whims and fancies, however, each model behaved as a regular trouper and posed like a mannequin when the 200-pound camera and microphone was demounted from the tripod and wheeled on a hospital stretcher wagon along the row of bath tubs for the final close-up.

Other phases of child hygiene were dwelt upon in a short talk by Dr. Anna E. Rude, director of the bureau of child hygiene of the county health department and now temporarily located in Washington, D. C., having been requested by Secretary of Interior Dr. Ray Lyman Wilbur to attend President Herbert Hoover's conference on child health and protection.

The absence of sound with this type of a picture would make it almost valueless. The verbal instruction and the "coos" (possibly other vocal noises), especially, make it of interest to young and old, men and women.

Dr. John L. Pomeroy, Los Angeles County health officer, has already developed the use of the silent motion pictures to a considerable extent in his program of health education but certain limitations have acted as barriers to further progress. The library of the health department contains one-reel films of such subjects as "The Story of Water", "The Story of Bread", "The Hygiene of Recreation", "The Story of Milk", and other topics dealing with dental hygiene, sanitation, personal hygiene, and features showing various activities of the health department. Expenses for filming were defrayed, for the most part, through the cooperation of local dairies, bakeries, and water companies who were interested in informing the public of hygienic methods of production. These films contain no advertising but are of a purely

(Continued on Page 45)

Here are the babies being properly bathed while Talkies are being made to show other mothers proper health methods. Also skilled nurses lecture on weights, etc.

General Electric Builds World's Largest Mazda

WHAT is claimed to be the largest incandescent lamp ever constructed has been completed recently by engineers of the National Lamp Works plant of the General Electric Company at Cleveland, Ohio.

Information regarding this giant bulb has been filtering into Hollywood for some time, so when Peter Mole, of Mole-Richardson, Inc.; Frank Graves, chief engineer of Universal Studios, and Fred E. James, Sales Engineer of the General Electric Company, were on their way to the S. M. P. E. convention at Toronto, they stopped off to see it. The enormity of the lamp, unbelievably huge, took their breath away. They expected to see something unusual but nothing like what was placed before them.

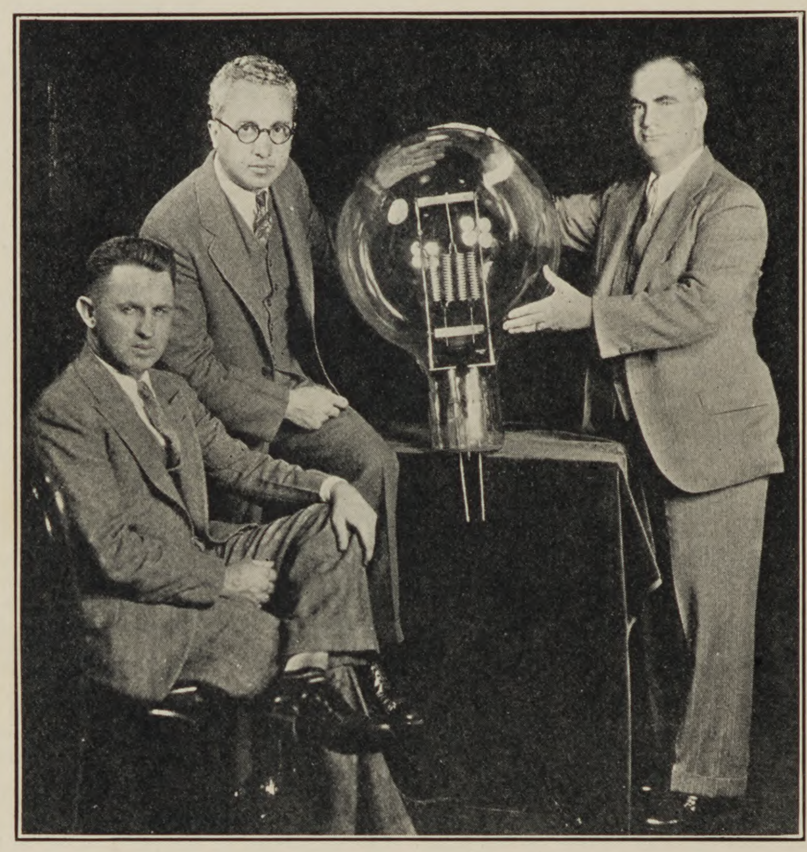
Some idea of its enormity may best be gained from the following figures:

This great super-mazda lamp has a current capacity of 50,000 watts. The tungsten filament was made from a special tungsten slug ⅝-inch square in cross section, 24 inches long. If this much tungsten was made into filaments for 25-watt lamps, it would have been sufficient to make 125,695 such lamps. This is the largest incandescent light bulb that has ever been made, and presented a number of very difficult problems in manufacturing. For instance, it is necessary to let into this lamp a current of 450 ampheres, and to give a proper seal to these lead-ins, it was necessary to develop an entirely new and ingenious construction.

The bulb is twenty inches in diameter, and was blown from hard glass, it being necessary that the wall have a uniform thickness throughout. In such a bulb were mounted in a projector, such as used in Motion Pictures, it would develop a beam candlepower of approximately three million.

While a lamp of such great power may not be of immediate use in Motion Pictures, the experience and knowledge gained from such a development will contribute much toward the perfection of design and the large types of lamps now in use. Just as the design of racing automobiles has contributed much of value to the design of your motor car, so the building of these Super-Mazda lamps is contributing much toward perfecting the lighting equipment so essential to the successful production of Motion Pictures.

The engineers of the Nela Park Development Laboratory were very much interested in getting the practical experience of the users of incandescent studio lighting from Messrs. Mole, Graves and James. These gentlemen are very optimistic as a result of the close attention which they found the lamp people are giving to the problems of the Hollywood Studios.



Peter Mole, of Mole-Richardson, Frank Graves and Fred E. James inspect world's largest Mazda lamp.

$2,500,000,000 Now Capitalization of Motion Picture Industry

THE important part that motion pictures play in the life and business of the nation was brought out by Will Hays recently when he made known in a speech in New York, before that city's Board of Trade, facts and figures that completely dwarf many other long-established industries and place the picture industry in the position of being one of the greatest enterprises of the country.

Presenting these facts, Mr. Hays declared that the picture industry is entitled to the support of "all business that has vision and idealism."

"Cynics and poseurs," declared Mr. Hays, "fling the phase 'business civilization' as an epithet. We accept it with pride, as an inspiration to keep our faces forward on the road we are climbing.

"Churches, schools, cultural opportunity of every kind, facilities for research whence science comes, scholarships for the ambitious, leisure for religious contemplation and for the pursuit of beauty—those are the gifts, increasing every day of American business to the world at large. The growth of the spirit is made possible by the mastery of the physical and material necessities and limitations, which have retarded the race in the past.

"We have, within the past years, increased the weekly aggregate motion picture audience in the United States by 10,000,000, meaning an increase each week of that many direct stimuli toward possession of comforts and conveniences available to the American family.

"As a business, we met the challenge of sound pictures with the necessary investment of $500,000,000 in two years. The total capital necessary in the industry has climbed to two and one-half billion dollars, distributed among nearly 100,000 stockholders and thousands of others who participate in theatre ownership.

"The industry employs 325,000 men and women. We use 150,000,000 feet of negative film in this country each year and 1,500,000,000 feet of positive film.

"Export of positive film during the first nine months of 1929 increased 41,000,000 feet over the corresponding period of 1928, and the Department of Commerce estimates that for every foot of American motion picture film which goes abroad, a dollar returns in stimulated trade.

"The motion picture's greatest aid to business is the furnishing of wholesome amusement and relaxation at a price the workingman can afford.

"We have wiped out confusion and hardship which formerly attended the life of the movie extra. We have developed a system of arbitration which in five yeaars has settled out of court 73,871 disputes involving more than $17,000,000. Within the

(Continued on Page 41)

On Christmas day 1949

Twenty Christmases ago, the early products of a handful of film producers formed the main holiday treat of a very few thousand theater-goers. What kind of movies these patrons saw is now a kind of ancient history.

Christmas Day, 1949, will see a progress fully as striking as that represented in the movies which fifteen-odd million persons in 1929's Christmas audiences will enjoy.

In tomorrow's films, as they are in today's and were in yesterday's, the major technical advances are destined to bear the stamp of the Bell & Howell Engineering Development Laboratories. For they will be advances made possible of achievement by the tremendous technical resources accumulated by Bell & Howell during its 23 years of leadership in this industry.

You are invited to bring your technical problems on any phase of motion picture making and showing to

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New Bell & Howell Engineering Development Building

Stage Technique in Talkies

(Continued from Page 3)

fore sound invaded the picture studios the cinematographers could do about what they pleased, and the sound men, in their laboratories and broadcast studios, had their own way likewise. With the merging of the two techniques plenty of difficulties arose, and in some studios the less enlightened men in each group began to get on the nerves of similar temperaments in the other group. There was no good in that for anybody, so the cinematographers, as the senior body, started a movement for better understanding and recognition of the ultimate mutuality of interests. Before long the public will pay to see and hear only those pictures in which the story is good to begin with and the photography and sound are good after that. Such technical discussions as the one cited above benefit the whole industry enormously by promoting the proper feeling among the men responsible for reproducing scene and sound.

Having considered these general aspects of moving picture sound recording at some length, we may proceed to a more technical description of the methods employed.

The studio itself is first treated internally to reduce the period of reverberation to a value suitable for dialogue recording. So much has been written on this subject, starting with the classical work of Prof. Wallace Clement Sabine down to the present extensive literature, that it is merely necessary to state here that for good speech recording the room should have a period of not over 0.5-0.75 second, and if the volume is too great to permit the period to be brought down to this value it becomes necessary to box in the set with absorbents, making a studio within a studio. The absorbents used must be effective at low frequencies as well as high, which generally involves thick layers (2-4 inches) of such materials as felt, mineral wool, and other compounds. In recording of music higher periods are allowable.

The next problem is to bring the microphones close to the actors, say between two and five feet. Within this range the best intelligibility is secured. Beyond it a loss of the high frequencies of speech, which are so essential to intelligibility, is inevitable. Furthermore, since these tones issue from the mouth in the form of a beam, like the radiation from a searchlight, the microphones should face the actors quite consistently throughout the action. This may entail placing a number of microphones, if the business of the play is such that it cannot be confined to a small area. And now complications arise because of the necessity of keeping the microphones out of sight of the camera.

Fig. 1, drawn to scale, shows a typical problem. The scene takes place in a drawing room, which is shown in side elevation, the background being the wall at the left. There is the inevitable fireplace, with the ancestral portrait above it, and two people talking in the direction shown. The camera is set for a long shot, about 40 feet from the back wall of the set, so that the focal plane is about 36 feet from the camera lens, the two actors being four feet out from the wall. The director wants the camera to take in the ancestral portrait on the back wall. In photographic section we have, then, an isosceles triangle, ABC, with a 20-foot vertical base, BC, and a 40-foot altitude, DA. The microphones must either be outside of this triangle, or, if they are to be placed within it, they must be masked from the camera. The usual location for the microphone in speech pick-up is above the heads of the characters, just out of the camera field, and in front of them. Referring again to Fig. 1, it is clear that a pick-up of this type is not feasible in this case. Measuring from the sound source E between the mouths of the two actors, the nearest point on the border of the photographic field is F, the intersection of the perpendicular dropped from E to the side BA of the triangle. This is about 10 feet, considerably too far for high quality speech pick-up. Furthermore, the microphones would be practically over the heads of the characters and out of the high frequency beam. If the microphones are moved forward along BA to a point in the line of the beam, about the best that can be done is point G, which is 18 feet from the speakers, a hopeless distance under most acoustic conditions for sustained dialogue. Hence in this case, barring a lateral pick-up, about the only recourse is the placing of a small table, a chair, or other piece of furniture at H on the stage floor, in which a microphone can be concealed about waist-high four to five feet from the heads of the actors. This method may run into other complications, of which more will be said later, but one does not have to be much of a geometrician to conclude from Fig. 1 that it is the only system offering any hope of natural reproduction at all in the situation shown.

The great advantage of the picture close-up in speech pick-up is shown in Fig. 2, which is drawn to a scale twice that of Fig 1. The camera has been moved to within 19 feet of the back wall, and the focal plane is now 15 feet from the lens. The camera height remains at six feet, as before, but it has been tilted forward at a five-degree angle. The optical triangle with which we must deal, ABC, includes an angle at the apex A which is not much less than in the long shot (20 degrees instead of 28), but, as the business of the scene proceeds much nearer the apex, everything is more favorable for sound. (The above photographic figures should not be taken too literally; they are intended only for illustrative purposes.) The camera field includes the heads and torsos of the actors, the upper line being some two feet over their heads (EF). A good pick-up position is available at G, out of range of the camera, fairly close to the direction of speech, and only four feet from the source. The only drawback is that G lies no more than 12 feet from the camera, and if the latter is not well silenced objectionable camera noise may be picked up. This is always a possible difficulty in close-ups, but the camera manufacturers have made notable progress in quieting their machines by judicious substitution of fibre gears engaging with metal ones, and similar measures. Of course in extreme cases the camera and its crew may be put in a sound-proof booth, but this practice interferes so much with effective photography that it is being discouraged in most of the studios. A well-silenced camera is usually safe to within ten feet of the microphone, when the speech level is not too low, and up to this point it may be trucked and manoeuvred to get cinematic effects which nobody who knows anything about picture-making wants to sacrifice.

Of course, just as in Fig. 2 the camera view slides past the microphones just below their location, it is sometimes possible to use the same expedient laterally. If the shot cuts to one side of the actors within a foot or two, a microphone may be placed outside of the camera field, but close to the speakers, who should favor it somewhat in working. Usually a transmitter in this position must be closer to the actors, for a given quality of pick-up, than one overhead, because it is not so easy to center it with reference to a number of persons in the scene.

In the usual picture practice the long shot of Fig. 1 and the close-up of Fig. 2 would be taken simultaneously, the cameras being appropriately placed out of each other's field. There may be three batteries of two cameras each, taking close-up, medium, and long shots, respectively, all on one take. This saves time, and gives a wide selection of shots for editing, but it has grave disadvantages from the sound viewpoint. Returning to Fig. 1, assume that the action contains some shouts, the intelligibility of which is not important, followed by sustained dialogue which should be clearly recorded. The director may take his long and close shots simultaneously, with the sound pick-up at G (Fig. 1) which will be satisfactory for the shouts but result in poor reproduction of the dialogue. If it is not feasible to use a prop-pick-up (I donate this term to the industry, with a graceful flourish, as a fitting name for a microphone concealed in a piece of stage property) it would be a better procedure, from the stand-point of sound, to take the long shot with the 18-foot pick-up for the shouts, and then move the pick-up to G in Fig. 2 before photographing close-up. Most of the directors have already learned that it is better to follow this procedure, even though it takes a little longer.

The skilled sound engineer utilizes a great many expedients, based on common sense and a knowledge of practical acoustics, in carrying on his job. Since the major defect of dialogue pick-up is loss of high frequency tones, he prefers to work with a slightly tubby loud speaker, simulating the decrease in high frequency amplitude which is common in theatre reproduction, and avoiding the psychological illusion of good intelligibility which a tinny loud speaker would produce. He avoids closed sets, especially with parallel walls, knowing that flutter echoes prevail in such enclosures and that resonances in them favor the low, boomy notes. At times he places heavy damping in back of the microphone, as in the German broadcast "tent" or in American broadcast practice, but at a distance of 10-18 inches, since putting the transmitter close to a cushion or other absorbent is likely, again, to result in loss of the upper frequency range. When possible he picks up with a single transmitter, but if the action requires it he distributes a plurality of microphones and follows the actors with the mixer. Between live sets and dead he will sometimes choose the one and sometimes the other—or, in other cases, take what the scenic director gives him. But he will object strenuously to curved surfaces whose radii intersect in the region of pick-up, because of the difficulties caused by regular reflection in this range. He avoids placing microphones on floors, and in walls, corners, or enclosures, because of the accentuation of low frequencies in such locations. Most microphones respond proportionately to sound pressure, and their size is such that at the

(Continued on Page 46)

A scene from "Burlesque," a Paramount production

TAKING THE GREEN PAINT FROM THE BABY STAR'S PINK CHEEKS

THE soft, orange light struck from National Panchromatic Carbons (soft-arc) is particularly adaptable to close shots. The light is cooler. Gives true shade of flesh coloring without resorting to elaborate unnaturally colored make-ups. Takes green grease paint from pink young cheeks.

Light struck from National White Flame Photographic Carbons (hard-arc) is best for long shots. Brings richness of detail into background. Molds the face with a wealth of contrasting shadow and highlight, giving more depth and strength to the picture.

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Du Pont In Hollywood

ONE OF THE MOST *attractive business houses in Hollywood is the new home of Smith and Aller, DuPont film distributors. Above are shown a few scenes outside and inside their building on Santa Monica Boulevard. There visitors ever find a cordial welcome and an atmosphere of cordiality that is decidedly pleasing. The motion picture set shown in the lower left corner is a set installed for cinematographers to use for experimental purposes.*

Re: Industrial Films

AFTER you have viewed an industrial motion picture have you ever felt that if you had not seen it you would have been time and energy ahead? And again, after viewing another similar film, have you ever exclaimed, "By George, but that was interesting." And have you ever stopped to analyze the difference in the films?

Both scenarios were well written. The first film was produced in the usual manner—filmed—edited and titled. The second was produced in an *expert* manner. GOOD cameramen and electricians, expert negative developers and skilled laboratory technicians combined their brains and ability, added the special effects made possible by fine laboratory apparatus, and the result was an *interesting* film—a film viewed with pride by both the customer and producer.

The second type of motion picture, we are proud to say, is the type produced by our organization. Whether your film is silent or sound, standard or 16 millimeter, it is given the same skillful, scientific treatment.

BURTON HOLMES LABORATORY
7510 North Ashland Avenue
Chicago, Illinois

Dog Star Dies

Pal, canine star, is dead here. He began his career ten years ago with a small part in a Wallace Reid picture, advancing to the stage of popularity by his continued appearance in comedies. The dog was 14 years old.

De Mille Asserts Talkers Will Improve Our Speech

That the talking films will improve speech in America is the opinion of Cecil B. deMille.

"We have been growing steadily more and more careless in our use of the English language until the talkies and the necessity for perfect articulation caught us up short. The talkies have the power to reclaim this situation. By virtue of their very mechanical limitations they are setting up the highest standards of speech we have had."

Recent Releases of A. S. C. Members

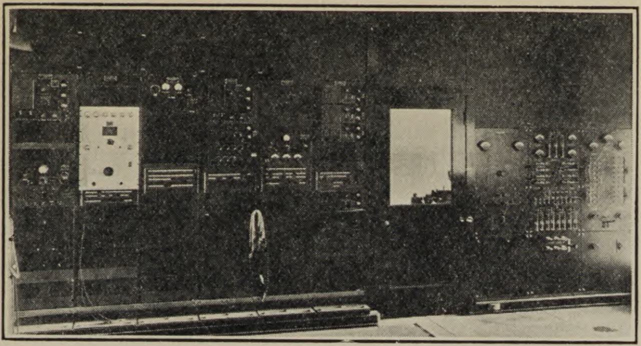
"The Mississippi Gambler"—Universal	Gilbert Warrenton
"Paris"—First National	Sol Polito
"Shanghai Lady"—Universal	Hal Mohr
"Song of Love"—Fox	Joseph Walker
"Seven Faces"—Fox	Joseph August

W. E. Acoustic Department Makes Rapid Progress

ACOUSTIC analyses of more than 500 theatres have been made in the last six months by the special acoustic department of Electrical Research Products under the direction of S. K. Wolf. Western Electric instituted this service to provide the industry with proper knowledge and information to achieve the mest results from sound wiring, and in every case where an acoustic analysis has been made it was possible to offer detailed recommendations for treatment to overcome any difficulties caused by theatre conditions, Wolf declares.

The department at present consists of a staff of 17 men under Wolf's direction.

No announcement was made at the time of its formation, the company wishing to say nothing until definite accomplishment had been made.



Electrical Test Shop E. R. P. I. Hollywood Laboratory

Electrical Research Products Opens New Engineering Laboratory on Coast

AN ENGINEERING laboratory for the West Coast has just been formally opened in Hollywood by the Electrical Research Products. The opening of the new laboratory at 7026 Santa Monica Boulevard is the culmination of plans that have been under way for almost a year, and a long felt need is at last filled, and immediate service is assured in the solving of pressing problems.

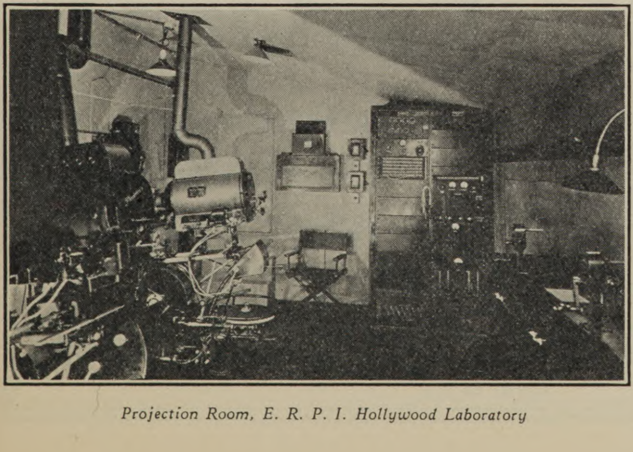
Ever since the completion of the first recording channels on the West Coast, Erpi engineers have had to contend with difficult problems brought about by the demands of producers. One of the outstanding was that of re-recording or dubbing and the development of suitable re-recording equipment and methods were carried on little by little in various studios during off hours when their equipment was not in use.

With the new laboratory it will be possible to test and pass upon changes and improvements suggested by studios more expeditiously, as well as to render a greater service to the New York departments in giving a more detailed and accurate picture of producers' problems as determined by company tests, rather than depending largely upon those made by studio engineers.

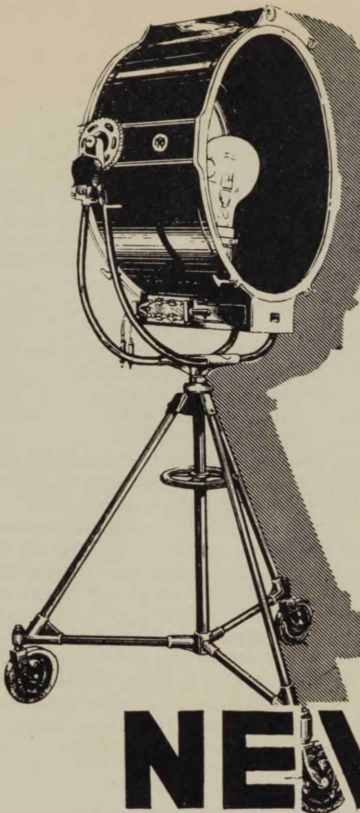
The installation embodies the latest improvements in equipment construction and includes a review room, a dark room, a convenient layout of room containing recording and electrical testing equipment and a machine shop, a small film vault, a sound proof room and an office.

The review room is equipped with a 2SX-41 system with all latest improvements. It has permanent seats for 38 people, but has sufficient size to accommodate about 75. Of special interest is the control table, which is equipped with a non-synchronous turntable, a fader, a volume indicator and a means for controlling ventilation. This room has already proved very useful, for holding technical meetings for Erpi engineers.

The electrical test room is perhaps the most important part of the laboratory and considerable thought was given to providing the proper equipment and facilities. It is, therefore, possible to set up almost any conceivable test in the minimum space of time. This room is also provided with a channel of recording equipment for recording on both disc and film. Associated with this room is a complete power equipment suited to the requirements of recording and testing, also the machine shop which is always a prime requisite in any well equipped laboratory.



Projection Room, E. R. P. I. Hollywood Laboratory



NEW..

lighting depth is made available with the Type 360 MR Sun Spot, sufficient for the deepest set.....and with it comes a new ease of operation: new ability to "get" technicolor; new certainty and assurance of performance made possible by an automatic switching device which operates itself, starting at a low current rate until the big 10 K. W. Lamp is warmed up and increasing the current load until it reaches the peak without the attention of the operator who has only to close the main switch.

The new 36-inch Sun Spot
M-R-Type 360

They are new.......but.......they are now in successful use at R. K. O., Universal, Metro-Goldwyn-Mayer, and United Artists......and they have proved their merit..........of course they are

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MOLE-RICHARDSON, INC.
Studio Lighting Equipment

Sound Pictures

(Continued from Page 5)

coming from the artificial person on the screen.

Right here we run into several limitations. In the first place all people do not hear equally well, or perhaps we should say that a group of people will not hear the same thing in such a way as to get the same impression from it. They discount this in real life but it becomes confusing and perhaps unpleasant when the artificial becomes involved. In this case then we have immediately to find some compromise on the loudness of the sound which will most nearly fit all. This should definitely be a compromise and not an attempt to suit the most difficult case. If we reason that the average person with average hearing and reactions makes up the audience, it is to his conditions that things should be adjusted; in this connection the theatre management has the problem of finding this average and of continuing to feel it out.

Loudness of sound is a much misunderstood and misused term. All our lives we have been listening to things. If we do not hear them well we say they are not loud enough. If it is a speaker we get him to talk louder. With a sound reproducing system, however, we introduce a new factor. Increasing the volume of sound from the horn changes the actual characteristics of the reproduction, and if carried to the extreme, we can have the condition of sound so loud as to be painful but still unintelligible. The cause of this brings us to the much discussed question of the frequency components in speech and other sounds.

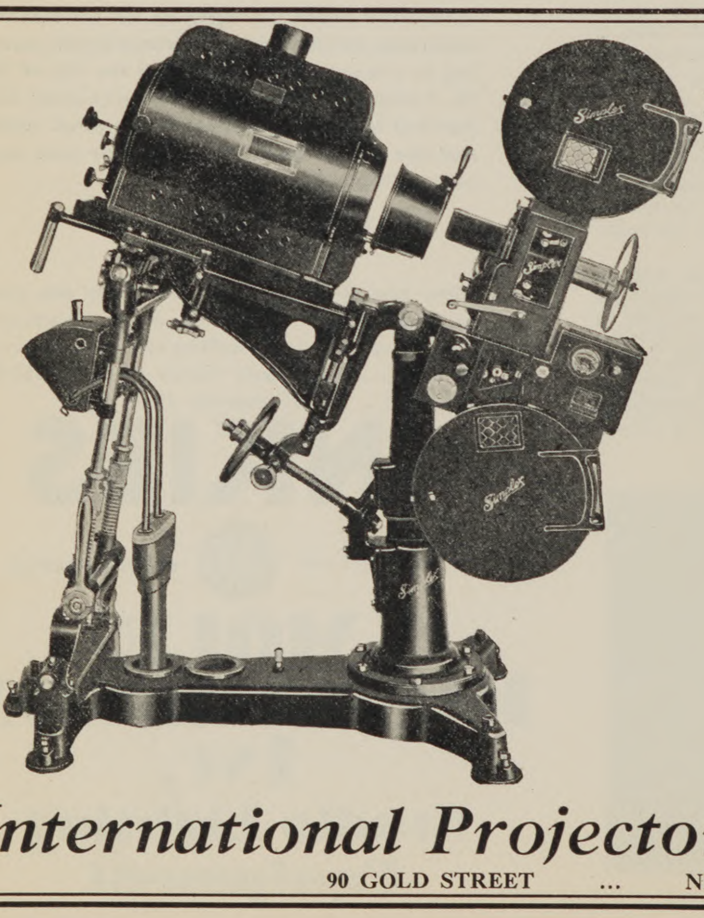
The original sound, whatever it may be, is made up of some definite combination of a number of frequencies in definite proportions. Let us assume that we can reproduce it faithfully at the proper volume. If now we increase this volume we find that the lower frequencies become much too loud and our sound becomes too bassy. Or, conversely, let us decrease the volume considerably below normal and it becomes thin—the lower tones have dropped out. This is easily tried with any record and illustrates the fact that for any reproduction we have a narrow range of volume inside of which we must stay to reproduce naturally.

Tied in with this matter is the question of the distribution of the sound, and with it the acoustics of the auditorium. Referring to the latter and its corrolary, reverberation, we find that reverberation, like medicine, when taken in the proper amount is a wonderful aid—but otherwise can become a tremendous disadvantage. Without reverberation it would be utterly impossible for a speaker to be heard in a large auditorium. With too much of it he is heard, but is unintelligible. In the latter case it does often work out, however, that under the same conditions music might not be unpleasant.

The acoustics of existing theatres used for sound pictures are as varied in their characteristics as the theatre designs themselves. As time goes on this condition will no doubt be improved. The reason for it is obvious, as existing designs had no need to take into account much more than seating capacity, viewing angle of the picture and the reasonably good rendition of musical accompaniment. With new requirements imposed the managements will gradually improve conditions, where necessary, with interior treatment of walls. In this connection it is of note in passing that the acoustics of a given room are much different when empty than when filled with an audience.

The other factor in distribution of sound is the arrangement of the horns. There are two schools in this respect, one placing horns back of the screen, and the other placing them around the sides of the screen. In the former case the horns are highly directional and are carefully pointed so that the combined effect of their several beams produces as nearly as possible an even distribution throughout most of the house. In the latter case the horns are much less directional, and in general there are more of them. Whatever the relative merits of the two methods may be, it is a fact that the actual distribution may in either case be far from uniform.

Reverting for a moment to the question of loudness and intelligibility we are confronted with the basic thought of articulation. By this is meant technically the ability to perceive and hear properly the sounds which make it possible to understand. Speech sounds may be broadly divided into two groups, more or less sharply defined—a comparatively low frequency group which provides the energy of the sound, and a much higher frequency group which provides the little niceties which result in articulation and intelligibility. Unfortunately, for our purpose, most of the energy producing group—and their energy is relatively great—are much the easiest to retain through all the processes of reproduction. Moreover, they are the ones which are most apt to be reinforced by reverberative effects. On the other hand, the articulation producing high frequencies are harder to record



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and much easier to lose, either in recording or reproducing. Our problem is them immediately outlined for us. We must be careful not to get more of the low frequency components in our recording than the original had, but we must strain every effort to keep and foster the high frequencies, perhaps even to the point of exaggerating them to a slight degree. This applies especially to dialogue, and to singing where an understanding of the words of the lyric is essential. Musical numbers can often afford to suffer more from loss of high frequencies, but in doing so usually creates the effect of being smothered or confused.

The next two factors are so tied in to each other that a joint consideration of them is proper. They are sound perspective and the monaural effect of all present sound reproduction systems. To take the latter first, the monaural effect is the name applied to the condition that a pick up microphone can represent but one of our ears. Human beings with their two ears and brain have the faculty of sorting out the sounds which they want to hear and of automatically sensing the small time difference between sounds striking first one ear and then the other. It is this faculty which enables us to hear voices above a crowd, to sense the direction from which a sound is coming, to visualize the size of a sound source—in short, to do all of the myriad things which we constantly do and can do with no other sense than our hearing. As compared with this we have in recording but a single channel through which our reproduction can come, and ultimately we hear it from a single set of horns. There is at present no way of simulating the effect of our two ears other than to use two channels throughout and to listen on a specially connected headset. By this means a good imitation of normal hearing may be obtained, but obviously this is not for theatre uses. We must then so plan in recording and reproduction as to create for the audience an illusion of normal hearing. The single picture is a good parallel. Lacking stereoscopic photography we trick our available photographic processes to produce an approach to a stereoscopic effect. As we provide an artificial brain for the camera, just so must we provide the brains for the microphone.

Manifestly, if we can maintain, and even to some extent exaggerate, the perspective of our sound we can help to get this two-eared illusion. Perspective in sound exists just as truly as picture perspective. Without going into a detailed discussion of it, the difference which we perceive in sounds from, say, various distances, is not as it might seem at first thought, merely a change in the relative volumes. There is a definite change in the composition of the sounds. As the source moves away from us the sound loses its high frequency components as we hear it. Hence, one reason for the greater ease in understanding a person close to one's ear.

Following the same thought the perspective changes with the type of action. If we are to have the illusion of being in an audience watching a stage play, we have one type of perspective. Here the characters are talking to one another, but are definitely doing it in such a way that the audience can hear. If, on the other hand, we have the vaudevillle skit, the actor is performing to us in the audience, and may be made much more intimate and apparently louder because of the nature of his act. Contrasted with this is the more nearly motion picture type of thing where the audience might almost be eavesdropping on the action taking place on the screen. In this case we would expect to hear quiet dialogue, almost as though we were in the room but unknown to the performing occupants.

From another standpoint, dialogue from a speaker in the foreground must clearly come from his lips and from no where else. If he moves to the back of a deep set, the source of sound, while in general at his lips, still becomes a little more confused because of the natural reverberation in his surroundings. If, however, we think of music—an orchestra—we more properly feel the orchestra to be in its right place if the sound appears to emanate from all around the screen or even to some extent from an imaginary room in back of the screen. Preservation of the proper sound perspective is probably one of the greatest factors in the successful production of the required illusion.

Thus far we have assumed that we may reproduce the entire range of volume present in the original. This assumption would seem to be imperative if we are to create the illusion of real life on the screen. Unfortunately this range of volume is not available and will probably not be for some time to come. In the first place, as we know from theoretical studies and from our individual experience, sounds are not always heard only—they are often felt—particularly when loud. We do not hear an explosion near us half so much as we feel it—it shakes us all over. With the apparatus available to us this condition cannot even be simulated, as the total range of sounds we hear, and otherwise sense, covers a tremendous volume range.

As compared with this the normal volume range available to us in recording is but a fraction of this total. The recording volume range has as its upper limit the amount we can get on the record without overloading it, and as its lower limit the ground or surface noise in the record. We must stay between these limits.

This range can be considerably extended by accurate and expert manipulation of the theatre fader, and as time goes on we can hope that the technique of providing such control in the theatres will be studied and full use made of it. At present the most that can be expected is to have attention paid to a few very simple fader cues, and even they are often missed so completely as to cause serious detriment to the effect desired. Automatic fader control is feasible, and has been worked out experimentally. Adaption of some form of such control would be a marvelous aid to the consistent production of the effects we desire. In isolated cases a fader control has been placed in the audience where the operator can feel the audience's reaction and keep the volume at the right point. This has been very successful where done. It has the disadvantage of requiring an extra operator, a disadvantage which is more than offset by the fact that with such control a picture may be consistently put on right—without it, consistent performance is nearly impossible.

This brings us to the important and difficult problem of the adjustment and manipulation of the sound apparatus in the theatre. The nature of this apparatus is such that extremely fine and careful adjustments must be made—and constantly maintained—in order to secure proper results. Theoretically this should be quite simple. Actually it is well nigh impossible. Whether the record be released on disc or film, the projection problem which confronts the producer is almost overwhelming. This is said without anything in mind which might be derogatory to theatre management, or operator, or apparatus supplier. It is simply the result of the rapid growth of this business. The studios are doing whatever they can to learn the problems of the exhibitor, and the exhibitor is doing his share of learning as well. The equipment used is of many kinds and of many degrees of perfection, the care and use which it gets are as varied as can be expected from the standpoint of the human element. Many are groping for an understanding of what is to be expected from the sound product itself. We have all had many times the unpleasant experience of hearing a picture in a theatre where the sound was very bad, when the same picture in our own review rooms was very good. Or perhaps of hearing the same picture twice in the same theatre—once it would be fine, the next time unbearably bad. How seldom have we heard a really excellent performance of a product which we know to be good.

There are two practical answers to this problem, and to the other phases of the recording and reproduction problem. The first is the creation of a better understanding between producer and exhibitor of their sound problem. The other is the constant attempt on the part of the studio to so guide its work that the product is not only made as nearly "fool proof" as possible, but that it also have in it enough of the intelligent exaggeration and artificial naturalness that it may be played under poor conditions and still sound fair. This art of intelligent exaggeration is gradually evolving among the various studios, and if done with a clear knowledge of what the product will be up against in the field will be of tremendous value in enhancing the usefulness and success of the sound picture.

Roy Davidge Film Laboratories

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SCREEN STAR'S VOICE CAPTIVATES PARIS

Hope Hampton, by Opera Triumph in Paris, Becomes One of Talkies Finest Prospects.

NOW AND then one meets a woman who combines undescribable beauty with unusual versatility. Such a woman is Hope Hampton who appears on the cover of this magazine this issue.

To describe the beauty and charm of Miss Hampton is something beyond the ability of mere man. It takes an artist with his gorgeous colors to do this adequately, for only colors can describe the magnificent and fiery red hair and the coloring of this actress. Miss Hampton has been seen in many beautiful pictures in natural colors, and those who have seen them never stop talking about the way she fits into color photography.

However, Miss Hampton's claim to fame is based on more than her beauty and ability before the camera. She has scored signal triumphs on the stage in light opera and musical comedy and now has done what no other screen actress has done—has scored an outstanding and signal triumph in opera.

It has been years since an American girl has carried Paris in quite the way Miss Hampton did when she made her debut at the Opera-Comique. As "Mimi" in Puccini's "La Boheme," and as "Manon" in Massenet's opera Miss Hampton stamped herself as a great artist and won the universal acclaim of the severest critics of France. Twelve times was this American screen actress recalled after the final curtain had dropped on her performance of "Manon". Her acting and beautiful soprano voice had her audience enthused to a point almost of delirium.

Some idea of the way she triumphed may best be gained from a few of the critics' reviews, extracts of which follow:

"Her success was immediate and striking. The instant she appeared, the crowded hall gave her an ovation, so impressive was the feeling that here was the ideal Massenet heroine. The beauty, brilliancy and charm of Miss Hampton assured her the triumph which her ravishing voice confirmed throughout the evening."—*Journal des Debats.*

"She interpreted the role deliciously, and seemed, by her personal charms, her grace and coquetry, the very personage of a work in which is reflected the genius of the French lyrical theater."—*Le Matin (Jean Prudhomme).*

"A delightful Manon and her debut at the Opera-Comique was crowned by brilliant success. Delicious singer, expert actress possessing the highest degree the rare qualities of sincerity and emotion served by an extraordinarily racy temperament. Her voice is of the most agreeable quality, clear as crystal, musical, sonorous, brilliant in the upper register, sweet in the medium.

"She acted the death scene in the last of 'La Boheme' with touching intensity. She was truly admirable."—*Le Figaro (Andre Nede).*

"Miss Hope Hampton is delightfully pretty and young. Clever actress, sensitive and witty, she is also an accomplished singer. Her ravishing pure voice flows fresh and facile like the waters of a spring."—*Paris-Midi (Pierre Lazareff).*

"It would be impossible to imagine a more exquisite appearance than that of Hope Hampton. She possesses the following essential qualities, so rarely united: sincerity, technic, art and feeling. An admirably placed voice, supple, well disciplined, fine allure and extraordinarily racy."—*Excelsior.*

"*Hope Hampton gets new praise in role of Mimi.* Besides her singing, Miss Hampton's acting was charming, as can be expected of an artist who already has won renown on the screen.

"*Hope Hampton scores a hit in 'Manon' role. Charms audience.* What a beautiful Manon! What sumptuous costumes. A critic is disarmed before this array of feminine charm. From the moment she emitted the high notes,—which were clear and of a remarkable good timbre—in the scene in the Cours-la-Reine, her success was assured."—*New York Herald (Louis Schneider).*

"Plastically, Miss Hampton was the dreamed-of Manon, very beautiful, graceful, harmonious in her gestures and most beautiful costumed. From the vocal point of view, her interpretation was excellent: the young artist manages her naturally agreeable voice with ease and finish."—*Le Petit Bleu (Andre de Montgon).*

"A beautiful American artist. Miss Hope Hampton in Manon received the consecration and homage of Paris. She triumphed over all difficulties and when the final curtain fell, she was recalled twelve times. Miss Hampton was not only a pleasure for the eyes: her clear voice, with its pure and nuanced high register, was marvelous, especially in the St. Sulpice scene, so difficult for foreign artists to interpret."

"What is first of all so remarkable in Miss Hampton, is the address and sureness with which she presented such dissimilar personages of Manon and Mimi. Hers is a voice of penetrating charm, good metal in the high notes, exquisitely sweet in the medium."—*Comoedia (Jean Messager).*

"She obtained a success rare for Paris. Twelve recalls after the final curtain and mountains of flowers. Such a scene is not often witnessed, even in Paris. It would be difficult to imagine a Manon more gracious, prettier, more charming, more evocative of the epoch than Miss Hampton's."—*La Revue Russe; La Theatre et la Vie (Armand Dore).*

"*Great hit in role of Mimi.* Rapturous applause. If the young American soprano is not delighted with the reception given her she must be either ungrateful or terribly hard to please. Such demonstrations as the favorite numbers aroused are not often paralleled in Paris theatres. One lost count of the recalls at the end of the acts, in particular after the third, when enthusiasm became delirium. If all the clamour for encores had been complied with, we should have heard 'Boheme' almost twice in the one evening. Miss Hampton fits the role admirably. She is the Mimi."—*Daily Mail.*

"For the delineation of the character, she has the advantages of a seductive figure, native elegance and a vivacity of acting that lends itself to all the expressive nuances the part requires. When one unites as does Miss Hampton, intelligence and will to such splendid gifts as hers, there is no limit to the perfection it is possible to attain."—*L'Intrasigeant.*

"Miss Hope Hampton units delicacy of expression in singing, in person and in gesture, the stage rendering these even more appreciable than the screen."—*L'Ere Nouvelle (Louis Laloy).*

"The personal attractions of the singer, her gorgeous costumes and the quality of her impersonation apparently told, for she was recalled and cheered as heartily as could be desired."—*The Boulevardier (Irving Schwerke).*

"As an actress, her gifts are incontestable. Her voice is fresh and like a brilliant thread."—*La Liberete (Robert Dezarnaux).*

"She won a great success in spite of the difficulty of singing in a foreign language. Her personal beauty, her youth, her graceful attitudes certainly stood her in good stead, but she would have been applauded for her voice alone,—a well timbered soprano, agreeable and light and which she manages with ease up to the highest notes."—*France-Auto (J. de Montgon).*

"There were unforgettable moments, for which Miss Hampton should be thanked. The public gave her an ovation at the end of each act."—*La Volonte (Gilbert Mauroy).*

"Extremely pretty, marvellously costumed, Miss Hope Hampton played her part with exquisite charm. As a singer, she was warmly applauded. Her voice is beautiful, wide in range, well timbered, and she conducts it adroitly. The success of the beautiful American singer was conclusive."—*L'Echo de Paris (Paul Gordaux).*

"She conquered the minute she appeared, thanks to the charm of her exquisite beauty, heightened by the sumptuosity of her costumes."—*L'Ami du Peuple (Andre Himonet).*

"The voice of this singer is supple and brilliant in the upper register, and she sings high D sharp without the slightest difficulty. Her costumes are extremely sumptuous."—*Le Courrier Musical et Theatral (Louis Charles Battaille).*

"The voice, ample and agile, is ravishing in quality; its musicalness is expressive. This young singer is a great artist."—*Ambassades et Consulats.*

With color and sound now the thing in pictures, it is the opinion of this writer that the producer who is fortunate enough to secure Miss Hampton for a picture in color and with songs will realize ere long that producers with foresight and good judgment must watch opera as well as the stage and screen for talking picture artists, for in Miss Hampton one finds an unusual subject for both color and song.— H. H.

RALPH STEINER, *former Dartmouth student, who won first prize in the 1929 Photoplay amateur contest for his non-dramatic film H^2O, is pictured above. Steiner showed, by his selection of plain water as his subject, a rare photographic mind that gives promise of greater things in the Cinematographic future.*

Multicolor

(Contitnued from Page 9)

greatest step of all is the fact that Multicolor has achieved the hitherto impossible feat of making slow-motion pictures in full color! Since the introduction of the new *Rainbow Negative* numerous tests have been made under varying light conditions and with camera speeds as high as eight times normal, with perfect success. The results, in fact, were definitely better than the average of ultra-speed monochrome, but with perfect color added. By virtue of its simplicity, Multicolor offers the whole Industry the boon of perfected, workable color, for not only may it be used by the greatest producing companies, but by individual industrial firms as well. There is a surprisingly great field for color in modern industrial filming, though not enough to justify the vast cost of special cameras and apparatus whose use would be limited solely to color work. In this field, Multicolor, requiring only a special magazine and film, is supreme, for once the film gate is adjusted to Multicolor work, any Bell & Howell or Mitchell is at once a color and a monochrome camera, for either process may be used without further change.

The personnel of Multicolor is as well known as is the process. Executive control is vested in William J. Worthington and Rowland V. Lee, neither of whom need further introduction to anyone connected with the films. It is a tribute at once to their sagacity and to their faith in the industry which has given them so much, that they have shunned the speculations of so many film folk, and reinvested their money in what they owe so much to—motion pictures.

The technical development of multicolor is the result of more than five years' intensive effort on the part of William T. Crespinel, who has frequently found time to contribute to these columns, and who is internationally famed as an outstanding cinematic scientist. His achievements with Multicolor have been made in the face of repeated discouragement from "expert" sources; assurances that each impending step was attempting the impossible. What he has attempted may have been impossible once, but today nearly a dozen companies are using the perfected results of his labors in their current production.

"The only limitations now affecting Multicolor," says Mr. Crespinel, "are those of our own laboratory capacity. We are increasing that just as fast as is humanly possible; right now we are turning out more than 20,000 feet daily, but with every standard camera in the business a potential Multicolor camera, we'll have to make further increases yet, so we are building a plant capable of processing 1,000,000 feet a week. Aside from that, Multicolor has no limitations, for we can work under normal production conditions, and give the producer his daily rushes in both sound and color at the same speed he is now getting them in monochrome.

"Any of the present sound systems may be used with Multicolor, the sound track being colored by either one of the basic colors used in coloring the film. Furthermore, we predict that Multicolor will be perfectly suited to all the systems of wide film when they arrive, for our patented film-gate construction holds the films absolutely flat in the camera, and our double-coated prints being a single film, have no tendency to buckle in the projector. On the other extreme, we are devoting considerable time to research in connection with adapting Multicolor to the requirements of 16 mm. practice, for we feel its simplicity makes it the logical color process for the amateur."

Cinematography for the Multicolor firm has for some time been in the capable hands of William Williams, who has lately been joined by Ross Fisher, A. S. C. They, together with Mr. Crespinel, have been engaged in solidifying the actual practice of Multicolor cinematography to a point at which it is literally on a par with monochrome work from the practical cameraman's viewpoint. Williams finds the greatest feature of the process is that same simplicity.

"Like most of the other cameramen," he remarked, "I never used to think much of color work. When they brought color crews onto my sets they were just in the way, with their special cameras and their need for five or ten times the normal amount of light. But since I've been working with Multicolor, it's been different! I've found a process that will do anything that is possible with black-and-white and with the same equipment throughout. It's been a job convincing some of the boys of that, though, I can tell you!

"The other day I got one of those skeptics in a corner, and made him look at some of the stuff. That almost convinced him, but he wanted a real, personal test. So the next day I took one of our cameras out onto his set at the studio, let him set up the lighting

(Continued on Page 36)

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A.S.C. Members' Skill Again Demonstrated

Facts and Figures of Interest In Shooting Great Sea Picture

By Hal Hall

AS THIS writer has said many times, no group of men in the picture industry receives so little exploitation as do the cinematographers. Again and again we see spectacular pictures depicting striking and almost unbelievable scenes laid in distant lands. And if it were not for the skill of our cameramen and the cleverness of the cinematographers in the field of trick photography many of these scenes would never be shown—for the cost would be prohibitive if they had to be staged in reality. In addition, some scenes could not be made except by the skill of the trick cinematographers.

Take, for example, the first National picture, *The Isle of Lost Ships.* Here we have a magnificent example of the cinematographer's art at its best. On the screen you see a vast area of the Sargasso Sea literally covered with the wreckage of thousands of slime-covered ships. It is a magnificent spectacle; one that makes you fairly gasp at its enormity; makes you wonder where such a scene could have been staged.

Well, it was staged and photographed on three acres of dry ground on the First National Studio lot at Burbank, California, and on a miniature stage in the studio. On ground so dry and dusty, under normal conditions, that to merely walk across it would raise enough dust to almost hide an individual. And it was the magic of Fred Jackman, A. S. C., head of the miniature and trick department, plus the cleverness of Sol Polito, A. S. C., chief cinematographer of the picture, that placed this on the screen in a manner that makes one feel that it must have been photographed on a vast sea. Except for some actual wreckage, seaweed, shallow water and glass shots, the remainder of the great "Sea" with a forest of spars and rigging reaching clear out beyond the horizon was pure cinematographic magic. Camera magic by cameramen who rarely receive a word of mention when such spectacles reach the screen. Magic by men who year in and year out give an art to the screen that alone is the reason for America's supremacy in the picture field.

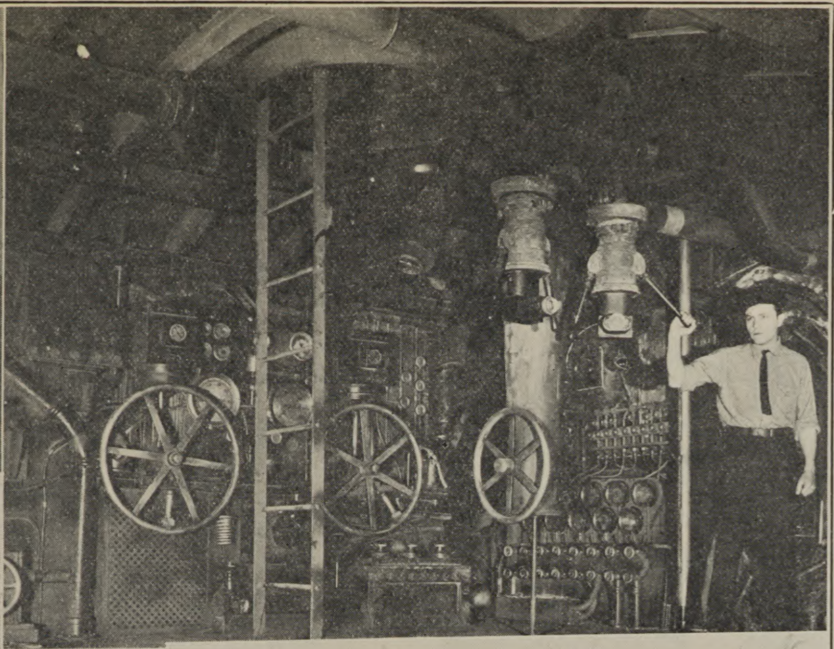
Getting down to facts and figures regarding the Sargasso Sea in *The Isle of Lost Ships,* the following information should be of interest:

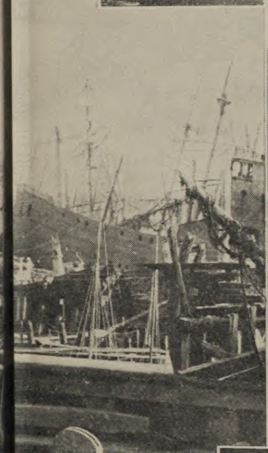
Cameramen Bring Sargasso Sea to Hollywood Studio

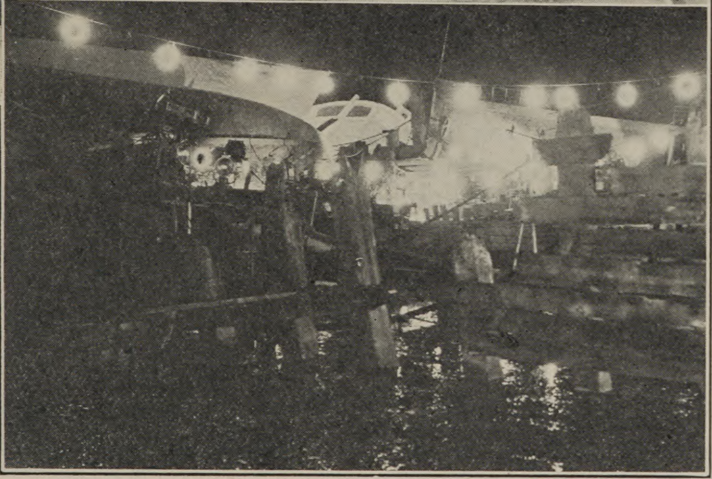
ABOVE ARE SCENES *at First National's Studios during the shooting of "The Isle of Lost Ships." Three acres of dry ground and a trick stage became the Sargasso*

Three acres of the Sargasso Sea was on the big back lot. Several hundred square miles of it was built on the studio's "Trick Stage," Number 5.

The area was compressed into a camera-width triangle 120 feet long on one side, 100 feet long on the other, and 160 feet at its greatest depth or distance from the lens.







Sea while this picture was being made. In center, top, are Director Irvin Willat and Chief Cinematographer Sol Polito, A. S. C. Bottom, center, is Fred Jackman, A. S. C., who had charge of the miniature and trick work.

The ships were miniatures, and false perspective was achieved to a certain extent, giving an even greater impression of distance. Behind the first twenty to thirty feet of real miniature wreckage, which varied in size and complexity from floating, mossy spars and wooden kegs to large ships, was merely a frame holding the masts, spars and rigging of vessels supposed to be behind.

Camera Magic Turns Lot Into Sea

Water, on which the miniatures actually floated, was, of course, used in the foreground. Mosses and lichens, and other growth of the sort represented the seaweed, which the trick department had studied and photographed.

Barnacles and other accretions such as dried salt were seen in the foreground miniatures, reproduced in painfully exact proportion.

One of the greatest problems of proportion was that of the rigging. Twine and cord for the foreground sheets was used, but for the diminishing perspective this went down to small threads, which, of course, were also used for the slighter ropes.

The wrecking of "The Queen," and her struggle in the storm up to the time she smashed the derelict and was crippled, as well as the small boat action was done in miniature. The submarine, interiors, exteriors and submergence, was done full-size.

The deck, cabins and lower spars of "The Queen" from the forward deck aft to the stern were built full-size on the studio lot, and this dry-land, three-quarters of an ocean liner was arranged on double rockers so that it would tilt in two directions; motion on board was achieved by Gimble tripods.

The clouds for the miniature scenes were duped in, except in a few shots where they were created for storm effects by smoke of a heavy, slow-rising variety released to float slowly up and sideways under a sky hood of blue cloth, carefully lighted.

So, there you have the story of the cameramen's skill in cinematographic trickery. The photographs in the layout here shown give an idea of results obtained, as well as give you an inside look at the actual workings. Truly a remarkable piece of work, stamping these men as masters of a great art—cinematography.

And—some picture executives are advocating that the names of the cinematographers be omitted from the credit titles on the screen. In fact one company has so ordered. From the point of view of a bystander who admires art, this writer believes that to omit the cinematographer's name from screen credit is about like leaving out the name of Columbus in the history of the world.

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Amateur Movie Making

By WILLIAM STULL, A. S. C.

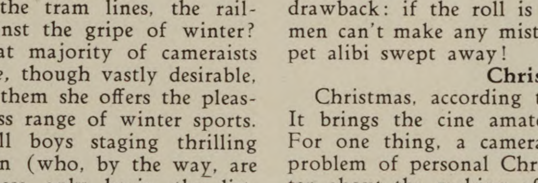
That First Snowfall

WRITING this in the midst of Southern California's famous sunshine, it is difficult indeed to realize that much of the rest of the world is draping itself in a mantle of snow. Yet such is the case, for the wires are daily bringing fresh reports of the various "first" blizzards of the season. These early storms offer the enterprising cameraist some of the most spectacular possibilities for pictorial cinematography that ever come his way. None of Nature's miracles is greater than the witchery by which she transforms even the most prosaic objects into silver-clad forms of beauty after every snowfall. In the cities, the changes are inspiring, while in the parks, and, best of all, in the country, her magic attains its fullest sweep. The soft, white blanket she spreads over field and fence and tree makes even ordinary scenes beautiful ones, and lovely ones, divine.

In this most beautiful of her moods. Nature offers every cameraist, no matter what his special bent, a glorious new field for his endeavors. To the pure pictorialist she offers the manifold beauties of snow-blanketed landscapes and the ice-coated wonders of winter seascapes. To the photographic follower of *Art Moderne*, she offers the strange new designs with which she overlays the familiar objects of life—streets, buildings, lamp-posts, even the lowly icicles. To the matter-of-fact realist, she offers a series of thrilling, everyday dramas. Surely no battles were ever half so hardly-fought and dearly won as the constant battles our great cities fight to keep their transport moving, to keep the vital pulse of men and food flowing on schedule, and to maintain communication with the world at large. What more thrilling subjects could such people find for their cameras than the battles fought by the tram lines, the railroads, and the city's fire fighters against the gripe of winter? But Nature does not forget that great majority of cameraists to whom such cinematic artistry *per se*, though vastly desirable, seems an unwarrantable expense. To them she offers the pleasure of photographing the whole endless range of winter sports. Children playing in the snow, small boys staging thrilling snowball battles, or building snow-men (who, by the way, are interesting stop-motion subjects), these only begin the list. The vast range of adult winter-sports are great subjects. People skiing, skijoring, tobogganing, and skating have endless possibilities, or mention only a few. Aside from the thrills latent in all of them, most of them have equally great comedy potentialities: the humour that can be extracted from plump Aunt Emma's first efforts on the ice, or lanky Cousin Horace's lack of grace on skiis can rival the efforts of many a professional comedian. And, Oh! the fun of seeing Uncle George, the Imposing, in difficulties with a pair of snowshoes!

To Filter or Not to Filter?

It must be admitted, however, that from a technical standpoint, Winter's photographic conditions are far from ideal. The intensely brilliant light reflected from the snow is unexpectedly strong in the blue and ultra-violet rays, and unless carefully watched, will play the very old scratch with our pictures. If we don't use a filter, there's likely to be no end of halation. and, if there are figures, a distressing soot-and-whitewash sort of a picture. It is really quite a problem, though, choosing a filter, for on the one hand we have the brilliantly white snow, rich in the powerful actinic rays, demanding a short exposure, while on the other hand, we have the extremely dark figures of the actors, demanding a long exposure. Therefore, unless we are to have a most unpleasant, contrasty film, we must in some way compensate for this disparity. The answer, of course, is a filter. But what sort of a filter? Not too light a one, for that would be no help. Not too dark a one, for it would increase the exposure necessary for the dark parts of the scene, and thus defeat its own purpose, by increasing the very contrast it should have lessened. A 2x filter will usually be found about right: say a Wratten K1½. After correcting the exposure for the filter, to be on the safe side, increase it just a trifle, and the contrast should be just about right. If you own a graduated filter, it can often be used to excellent advantage in this sort of work, using the middle, lighter, portion, with the clear part revolved so that it is over the part of the scene which least needs filtering.



Of course Panchromatic film is the best for making these winter scenes, for it alone gets the full benefit of the filters. Also, exposure meter, like Dr. Meyer's *Cinephot*, is of more than ordinary importance. Incidentally, while on the subject of light, the beauty of natural back-lightings just after a thick fall of soft snow, or a sleet storm, is worth photographing. Also, in winter close-ups, reflectors are surprisingly necessary, for without them even the most perfect complexions are likely to photograph even darker than the beach tans that were the style last summer. And though our modern maidens enjoy tanning themselves into regular Indians in June, they are strangely quick to rise in the wrath of injured virtue if a luckless photographer under-exposes their faces in December close-ups!

The last precaution in winter cinematography is informing the laboratory technicians that the roll they are handling contains snow scenes. If they know that, they will develop it accordingly, so that the best possible results are given—if you have taken proper care of the exposure. Of course, there is one drawback: if the roll is so plainly marked that the laboratory men can't make any mistake, some people are going to find their pet alibi swept away!

Christmas and Cameras

Christmas, according to all indications, is on the way here. It brings the cine amateur a number of things to think of. For one thing, a camera can do a lot toward lightening the problem of personal Christmas cards. So much has been written about the making of Christmas cards by still photography, that little can be added on that score, but perhaps the thought that a movie camera can be used the same way may not have spread so widely. Of course, considering the present cost of film, one can hardly suggest sending out reels of 16 mm. Christmas greetings—but individual frames are another matter! If one has one of the various enlarging devices which attach to the projectors, it is easy to find individual frames of sufficient artistic merit to be enlarged to form the backgrounds for photographic Christmas cards, while if the card is to carry the sender's face, a strip of movie film is just the thing to get it from, for surely among the hundreds of frames in each scene there can be found one which represents the desired face at its best, care-free, unposed, and natural. Besides, if one wants a really novel card, why not leave a small hole in it, and stretch a few frames of actual film over it, showing, say, the sender's face, in lieu of a signature? Even if these various methods do not please, the mere idea of carrying a movie motif through an ordinary card sets it apart as one to be remembered for its originality.

Snapping Santa

Christmas also brings a number of opportunities for special, personal filming. Of course the first thought that leaps to most minds is the personal record-film. However, the nature of most Christmas celebrations makes this somewhat difficult, though still distinctly possible. If such a record be undertaken, however, there are a few points which should always be observed. The first thing is to have a good general idea of what is to be shot, well in advance of the time of filming. Brief notes may suffice, but a reasonably complete continuity is best. Don't be misled by the time-honored delusion that by working haphazard you will capture spontaneity. You won't. Of course there will always be a certain amount of spur-of-the-moment inspiration once you have gotten used to the mechanics of filming, but as a rule it is worth while to remember that amateur films are in at least this one respect like professional ones: the most spontaneous-appearing touches are usually the result of deliberate planning. It takes very highly trained actors and directors to actually be spontaneous on the set. In real life, the most spontaneous touches are those which occur when there is no sense of the restraint which comes from an audience or a camera. Therefore, in making these record films, where it is possible to shoot people unaware, do so. It pays.

In making deliberately planned record films, never be afraid to use close-ups. In general, show your geography in a long-shot, and your action in close medium-shots and close-ups. Furthermore, remember that for effective close-ups, the more even lighting of light shade is to be preferred to dirct sunlight, except in rare cases. Also, if in making these scenes, any sort of interior-lighting equipment is available, use it, for indoor scenes are the heart of a Christmas picture. An ideal light for your Christmas picture is found in Westphalen's lamps which are designed especially for home use. Take scenes around the tree, of the children in the first joy over their new toys, and at the table. But, when shooting around the tree, remember that it and its decorations are highly inflammable, and act accordingly. Firemen are understood to enjoy their Christmas turkey as much as the rest of us, and to strongly resent having to leave it to put out Christmas-trees.

Another field is the movie *for* Christmas. If there are children in the home, a little playlet, specially staged, showing Santa emerging from the chimney and arranging the presents, perhaps to be met by father, and then suddenly vanishing, is a sure joy-bringer. Incidentally, the joy that multiple-exposure fiends can get out of making such a film, putting the old saint on the house-top, working the necessary disappearance, etc., in the more elaborate examples of such films, probably eclipses that of the children watching the results.

In any case, whether the picture be made *for* or *on* the holiday, the maker should remember this fundamental rule of amateur filming: *never show your audience anything but the complete, edited, titled version of the film.* To do anything else not only reduces their enjoyment, but is likely to injure your own reputation as a cinematic craftsman.

And—the Presents

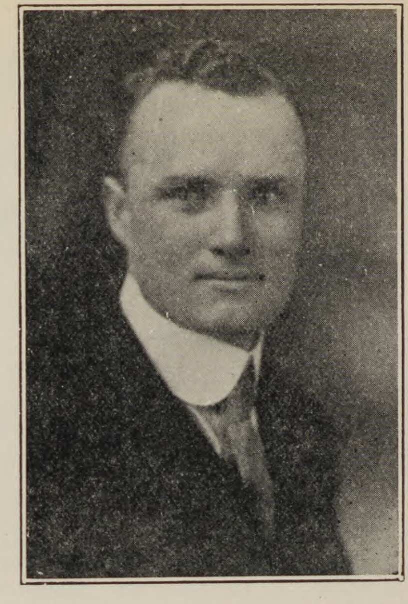
Since Christmas presents are an essential part of our thought of Christmas—a necessary evil or an enjoyable feature, depending on our viewpoint and the vagaries of the stock-market—why not make this a cinematographic Christmas? Most of us have at least a few friends to whom we are in love or duty bound to make gifts, who are cine amateurs. No matter how little—or how much—you may feel it proper to spend for such presents, there is surely some cinematic accessory which will just fill the bill, and, being a *cinematic* gift, will be appreciated beyond all measure. Most of the manufacturers, and many of the dealers, have issued catalogues which contain a wealth of gift suggestions. If you have cinematic friends, a glance at these catalogues will help to solve the gift problem, for you are sure to find something appropriate, whether it be a color filter or a super de-Luxe Talkie outfit. Incidentally, a few of these catalogues left "carelessly" in the right place, aided, perhaps, by discreet hinting, may bear very excellent fruit. Of course, we all agree that it is better to give than to receive—but it is just possible that other people, too, are having trouble in making the right choice, and need—helpful suggestions!

New Cut-Off Device

Canterbury, N. S. W.—New automatic cut-off slide, said to permit change-over from one projector to another without any interruption, has been patented in America and Australia by William McKenzie, former proprietor of the Canterbury here. The device can be used on all makes of machines, it is claimed.

British Talkie Activity

London—More than 250 installations of its talking picture equipment have been made by British Talking Pictures in houses throughout Great Britain, according to this company's announcement.



HERFORD TYNES COWLING, A. S. C.

IT IS with real pleasure that the editor of this magazine makes the announcement that Herford Tynes Cowling, head of the Eastman Teaching Films, Eastman Kodak Company, Rochester, N. Y., has been added to our board of editors.

Cowling, long one of the best known members of the American Society of Cinematographers, needs but scant introduction, for his name is known the world over. Born in Virginia, he chose photography as a hobby while only a boy. The hobby became a profession, and in 1911 we find him introducing motion picture photography into the United States government service. In 1913 Cowling became chief cinematographer of the U. S. Reclamation Service. In 1915 he photgraphed "See America First".

He left the government service in 1917 and went abroad for Burton Holmes. That trip covered the South Seas, New Zealand, Australia, Philippines, China, Japan, Formosa, Dutch East Indies, Siam, Federated Malay States, Straits Settlements.

In 1919 Cowling photographed the entire theatre of war in France, Belgium, Italy, Austria, Czecho-Slovakia, also Southern France, Algeria, Tunisia, Tangier, Sicily, Spain, Egypt, Palestine, Constantinople. He has hunted wild game in all parts of the world with both gun and camera and has written extensively on his travels, including a trip into the forbidden Thibet.

His pen will soon become active again for this magazine and our readers are promised some rare treats.

Talkies Increase Exports

INCREASE of about 25 per cent in film exports for the first nine months of 1929 as compared with the same period in 1928 is shown in a preliminary statement by the M. P. Division of the Dept. of Commerce. Total exports to all markets during this period in 1929 amounted to 201,137,429 linear feet with a declared value of $5,449,491, against 159,832,636 linear feet valued at $4,675,647 for the corresponding nine months last year.

Exports of positives accounted mainly for the large increase. Europe continues to be the leading market, and with the advent of sound films this has become the largest quantity market. This position was formerly held by Latin America, which shows a slight decrease in film imports for the nine months.

The United Kingdom becomes the leading individual market, followed by Germany and France. Australia, for the first time since 1925, fails to head the list of important individual markets, but it shows an increase of about 12 per cent in imports for the first nine months of 1929.

The Far East, Canada and British South Africa also show increases over last year.

Imports of sensitized but not exposed films for the period amount to 273,139,357, an increase of more than 50 per cent. Negative motion pictures imported for the same period totalled 1,926,749, a slight decrease. A decrease also is shown in imports of positives.

INFORMATION FOR AMATEURS

Amateurs—Send your problems to this department and we will solve them

Q. To what extent does the elevation of a camera effect the horizon distance?—F. T. D., Dayton, Ohio.

A. Obviously, a man on level ground can only see a few miles, but at 3000 feet one can survey a 58-mile circle, and at 6000 feet one of more than 165 miles. The Army's figures: for relative visibility are: 10 feet, visibility 6,800 yards; 100 feet, visibility 21,500 yards; 300 feet, 37,300 yards; 500 feet, visibility varies between 48,200 yards and 52,100 yards. If the object viewed is 25 feet high, these figures are increased to respectively, 17,500 yards, 32,200 yards, 48,000 yards, 59,900 yards, and a maximum (due to refraction) of possibly 63,700 yards, or over 30 miles. For a 50-foot object the figures jump to 22,000 yards; 36,700 yards; 52,500 yards, 63,400 yards, and a maximum of 68,600 yards.

Q. What materials are used for the snow and ice in winter scenes of professional movies made in such places as Hollywood? —J. E. B., Rainbow, Conn.

A. Salt and crushed marble-dust are often used for snow, while of late rolled oats and special bleached cornflakes have furnished the raw material for movie blizzards. Real ice can often be made in studio freezing plants, but solidified hypo is more popular, especially where skating scenes are being done, for the hypo-ice can be readily smoothed over by the application of a hot iron.

Q. What exposures should I give with the special red-sensitive film known as Panchromatic K?—R. H. B., Chicago.

A. Using such red filters as the Wratten No. 25, No. 70, or the regular "A" tricolor filter, in average light and normal camera-speed the stop should be f:2.5, though with special hyper-sensitized stock F:3.5 can be used. The hyper-sensitivity lasts about a month.

Q. How can I determine whether a lens is negative or positive?—R. B. K., Boston.

A. Perhaps the simplest test is to hold the lens at arms' length and rotate it in a plane at right angles to the line of view. If the image seen through it seems to go *opposite* to the hand's motion, the lens is convex, or positive. If it does not move, there is no lens action. If it goes *with* the motion the lens is negative. Also, a negative lens will not throw an image on a screen as a positive one does.

Q. What is the difference between direct and indirect titles? G. H. D., Seattle.

A. Direct titles are made from white cards with black lettering, photographed with ordinary (*not* reversal) film. The result is a film with white letters on a black field, which can be spliced in with the rest of the film and run as usual. The Indirect title is made by photographing a black card with white lettering using either reversal film, or normal stock from which prints are to be made, giving an exact reproduction of the tone values of the card instead of a reversed one, as in the case of the direct title. The direct method is the logical one where only a single copy is required and where speed is important. Where many copies are required, of course the indirect method must be used. In either case, positive film is used for photographing the title, by virtue of its superior contrast.

Q. Should filters be used only with panchromatic stock, or will they also benefit othocromatic film?—E. M. H., Boise.

A. The more common yellow filters are to a certain extent helpful with ortho stock, but they only reach their full effectiveness with Pan. As for the red and orange filters, they should absolutely be used only with Pan stock.

THE DEARDORFF COMMERCIAL CAMERA

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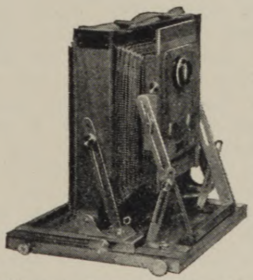

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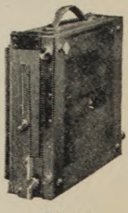


Closed

EXPOSURE PROBLEMS

A Unique Method of Estimating Exposure When Caught Without a Meter

By H. SYRIL DUSENBERY

IN ORDER to have an intelligent understanding on the subject of exposure it is first necessary to know just how the sensitive film emulsion records the image. We are all familiar with the fact that this image is directly dependant on the light that reaches the film, not only the amount of light, but the quality as well. When sufficient light reaches the film so that the image formed when it is finally developed is a clear and faithful representation of the original subject, it is said to be correctly exposed. Movie makers will find that with a little practise and experience this goal of correct exposure is not difficult to attain.

The only light that reaches the surface of the film when a picture is made is the light that is reflected from the subject itself. It should be remembered that regardless of the general brilliancy of the light, it is only that portion of it which is reflected by the subject that is effective. Naturally dark subjects do not reflect as much as white ones. For this reason dark objects require more exposure. Also a subject in the direct path of the light will reflect more into the camera than a similar subject receiving the light at right angles to it. The color of the light reflected must also be considered since the ordinary emulsion is much more sensitive to blue colors than to red. While the many factors that enter into the matter seem to make it quite complicated, in actual practise it is surprising how quickly the eye can be trained to judge the proper exposure necessary to obtain good screen results.

It is strongly recommended that the movie maker use an exposure meter until he has trained himself to judge light conditions accurately. Select any type meter that appeals to you and stick to it. Do not change meters continually. The Cinophot and Dremophot meters are particularly recommended as they actually measure the light reflected from the subject. These meters give very accurate results even in the hands of a novice. By doing a little systematic testing, you can quickly learn the shortcomings and errors in the readings of your meter. The matter of personal equation enters to a considerable extent with many types of meters as no two people see things exactly the same way. It is, therefore, suggested that your meter be tested and checked against actual screen results.

To test any meter, take an average scene, a street for example, and determine the exposure (lens setting) with it under the given light condition. Jot this down for future reference. Now shoot a few feet of film with this recommended exposure. This done, change the lens setting to the next larger opening and shoot again. Then change the lens setting once more, this time making it the next stop smaller than that originally indicated by the meter, and again shoot a few feet of film. Make notes of exactly what you have done. When the finished film is projected on the screen you can quickly decided which of the three shots appears the best and, by referring to your notes, you can then compare the lens setting that produced the best results with the setting recommended by the meter originally. It may be that you are in the habit of reading your meter too high or too low. This simple test will show you at once. It should be repeated under different light conditions and with a variety of different subjects. Both the film and your notes should be preserved for future reference. While all film possesses considerable latitude, a little careful testing in this way will quickly demonstrate that there is a very definite lens setting that gives the best results.

The old rule, "when in doubt over-expose," does not apply to film finished by the reversal process. Over-exposed film appears almost like transparant celluloid and the pictures are weak and devoid of detail. Under-exposed film, on the other hand, is dark and dense when finished. As the under-exposed film is the lesser of the two evils, the revised rule becomes, "when in doubt UNDER-EXPOSE." Incidently, the use of a smaller lens opening will make the picture sharper and more distinct on the screen. It is, therefore, recommended that the smallest lens opening, consistent with the prevailing light conditions, be used at all times. In this discussion we are assuming that the shutter speed is constant and that the exposure is controlled exclusively by changing the size of the lens opening or stop.

All things being equal a long shot requires *less* exposure than distant objects and the use of a slightly smaller lens opening is a close up. More light enters the camera when photographing distant objects and the use of a slightly smaller lens opening is suggested. On the other hand, do not fail to open up the lens at least one stop number when shooting a close up immediately following a long shot. It is to be remembered that when shooting close ups, especially with the larger lens openings, it is essential to have the lens correctly focused. To insure accuracy, the distance from the camera to the subject should be carefully measured with a tape line. Professionals always do this and you should do likewise if you want your close ups to be needle sharp on the screen.

Late in the afternoon, especially in Fall and Winter, the sunlight becomes very rich in red rays. This light is very deceptive as it appears quite bright to the eye but is rather inactive photographically. Often the change in color of the light is so gradual that it passes unnoticed, but the sensitive film is not fooled and the result is the pictures are dark and under-exposed.

Many methods have been devised to aid in the estimating of correct exposure. Most of these methods are rather cumbersome and complicated. While it is recognized that the many factors that enter in the determination of correct exposure make it almost impossible to devise any "rule of thumb" method to fit all cases, the following original system, worked out by the present writer and published here for the first time, will, under ordinary normal conditions, give a remarkably close approximation. The simplicity of this new system makes it easy to memorize. It is based on the use of 16 mm. reversible film. Normal shutter speed and average summer light conditions in northern latitudes are assumed. In this system the light conditions and subjects are each divided into four general groups. Memorize them! You then have the entire system at your finger-tips.

The Dusenbery System

Light Conditions	*Subject Classifications*
1—*Very Dull*. Overcast sky with heavy black clouds.	1—*Heavy shade*. Subjects under trees, on porches, etc.
2—*Dull*. Generally cloudy with no direct sun light.	2—*Streets* and buildings. Subjects partly in the shade.
3—*Bright*. Sun shining thru thin clouds or light haze.	3—*Open Landscapes*, White Buildings, sports and scenes without shade.
4—*Brilliant*. Strong clear sun light. No clouds or haze.	4—*Sea, Sky, Snow* and Beach subjects reflecting strong light.

To estimate exposure under this system using the above classifications, simply multiply the number of the light condition by the number of the subject class. The result is the lens setting in the "F" system! In the event that there is no lens marking that corresponds to the result thus obtained, it will be satisfactory if the next nearest lens marking is used. For example, the exposure for an average street scene in brilliant light is obtained by multiplying 2 by 4. The result 8 indicates that stop F.8 should be used. In the case of an open landscape with dull light, multiply 3 by 2. The result is of course 6. The nearest standard lens marking to 6 is F.5.6. While this system must be used intelligently, the accuracy of the results are almost uncanny. All who have given this system of rapid estimation of exposure a trial have enthused over it and it is hoped that this method will help the movie maker to solve his exposure problems. It is not intended that this take the place of an exposure meter. It merely serves as a guide to those desiring to estimate exposure quickly when no meter is available.

No mention has been made in this discussion as to the use of color filters. Every filter is marked with a definite factor by its manufacturer. This factor is usually given for both ordinary film and panchromatic film. The deeper the tint of the filter, the more the exposure. Full directions usually accompany every

(Continued on Page 36)

film Christmas Eve

with a

LITTLE SUNNY TWIN

Read What Movie Makers Say:

"If other amateur movie operators had enough sense to buy your 'Little Sunny Twin' their troubles in lighting would cease. I couldn't realize that it was possible to get enough light on 15 amps. to successfully 'take' indoor movies, but you convinced me. Have had excellent results, using Sunny Twin alone in taking an entire room full of people, using one reflecting screen."—Wallace T. Brown, New Rochelle, N. Y.

"I have taken several one hundred foot reels of the children with Little Sunny Twin and a B f 3.5 Cine Kodak, and the results have exceeded our greatest expectations.—Wm. G. Mantonya, City of Chicago Board of Local Improvements, Chicago.

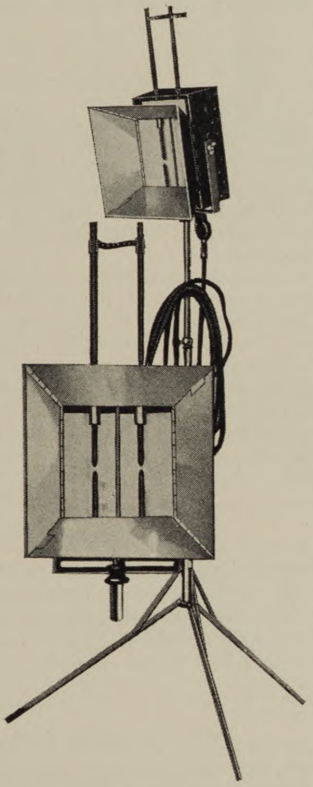
"I took pictures with the light at various distances as far as 25 feet from subject, and the result was astonishing. The film I took was praised by every club member."—Frank J. Buehlman, Rochester, N. Y.

"Send one Little Sunny Twin and 1 dozen carbons. The other lamp I got from you worked fine, did not even have to use f 1.5 at 18 feet.—Abe Cohen, Altoona, Pa.

"I have exposed three hundred feet of film with them, almost all Christmas pictures and they are *fine.*"—Wm. T. Jantzen, Berwick, Pa.

"Little Sunny Twin eminently fills a need in amateur cinematography."—James Iver, Salt Lake City, Utah.

"Little Sunny Twin is a perfect wonder! All its possible tests have proven A-1."—Robert Bard, Kino Klub, Claremont, Cal.



There it stands in all its glory and scintillating beauty—the Christmas tree! Have you ever tried to film one—and all the fun that goes on around it on Christmas Eve—on Christmas Day—and all through the holidays?

Get yourself a Little Sunny Twin Carbon Arc Lamp and all the indoor Holiday gaiety—whether it takes place during sunlight hours or darkest night, becomes a film subject well worth hundreds of feet.

20,000 C. P. for only $25

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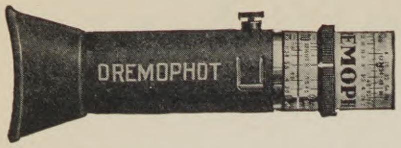

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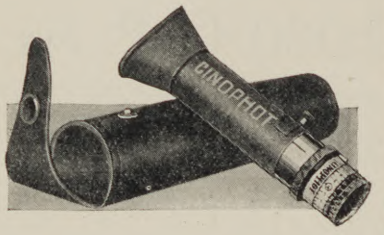
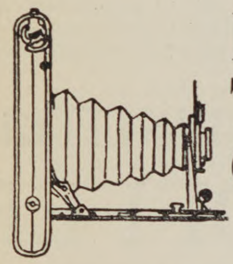


Let's Trade Cameras! ---Bass



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Of Interest to Amateurs

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A REFLECTOR is especially helpful, in fact almost indispensible for good results, during the fall and winter months when the light is not as bright as in the summer.

Filter

THE color filter made for use with the f.4.5 long-focus lens for telephoto effects will, according to the Eastman Company, greatly improve the quality of movies taken with this lens.

Cine-Kodak

ADVANCED amateurs who prefer the hand-cranked Model A Cine-Kodak, are informed by the Eastman Company that the present Model A, f.1.9, Series K, Cine-Kodak can be used for Kodacolor with Kodacolor film and Kodacolor assembly. Older Model A, f.1.9 Cine-Kodaks must be sent to Rochester before they can be used for Kodacolor work.

What To Give for Christmas

ANOTHER Christmas is approaching and that annual problem of what to give is with us. In the case of home movie makers, why not give movie equipment? Nothing could give them more pleasure. And then, there is James, or Fred, or Bill, who have been wanting a camera. Why not give it this Christmas? A partial list of equipment from which to select is suggested here:

Cameras, color filters, exposure meters, remote control device, portrait attachment, books on photography, a year's subscription to the AMERICAN CINEMATOGRAPHER, camera cases, lens modifier, Cinophot, Dremophot, focusing microscope, tripod, tripod heads, projectors, projection lenses, projection screens, range finder, editing devices, film storage cases, camera cases, Kodacolor filters, Leitz distance meters, correctoscope, speed lenzes, lenses of all kinds, Sunny Twin arc lamps for home movie making, make-up, film, still cameras, a Recordion home talkie equipment complete, new 16mm. releases.

Chicago Cinema Club Elects New Officers

THE Chicago Cinema Club opened its winter season recently with a well-attended meeting, and elected the following officers for the coming year: President, Dr. O. B. Nugent; vice-president, Joseph G. Davis; treasurer, U. S. Smith; secretary, Dwight R. Furness; directors, Howard Webster and Joe Simons.

New Kodacolor Lens for B. & H. Filmo 75

BELL & HOWELL announces a special lens, known as the 4 A T-H.C. 1 in. F1.8 for the Filmo 75 camera. This lens is designed particularly for Kodacolor work. It is smaller than the special Filmo 70 lens for Kodacolor, yet it is claimed to give the same degree of perfection for natural color photography. While it is designed particularly for color use it is said to be an excellent lens for black and white work as well.

Great Lite Projection Lens

FILMO projector owners who desire greater brilliancy in their projected pictures may now, according to Bell & Howell announcement, secure 25% more light. This is made possible by the new Great Lite Projection Lens which is now on the market for the Filmo projectors.

At present this lens is available only in a 2 in. focal length, but other focal lengths are to be offered later.

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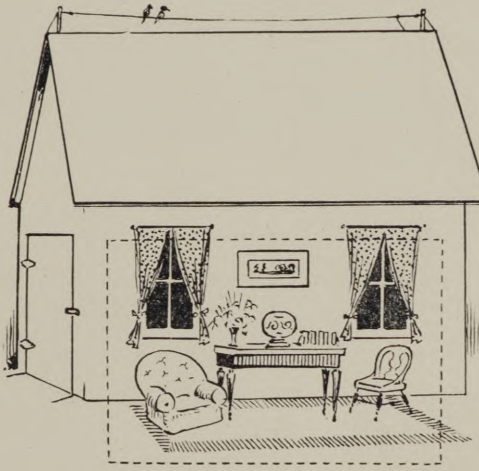
SETS FOR HOME MOVIES

The Exterior of Your Garage Becomes An Interior If You Know How

By HAL HALL

THE very important matter of "sets" is, perhaps, one of the most difficult problems that faces the home movie maker when he gets down to the serious business of shooting an amateur production. In the first place, the amateur has to hurdle that tremendous obstacle known generally as "mental hazard."

After viewing a particularly gorgeous array of sets, such as, for example, those in "Broadway," the ordinary home movie maker quite naturally feels a bit dazed when he steps out to create sets for the little picture which he and his wife are planning to produce. However, he need have no fears if he first of all decides, wisely, to leave the elaborateness to professional movies, and then uses the factors that are literally at his back door. By this I mean that an ordinary stucco garage offers amazing possibilities in the construction of sets for home use.



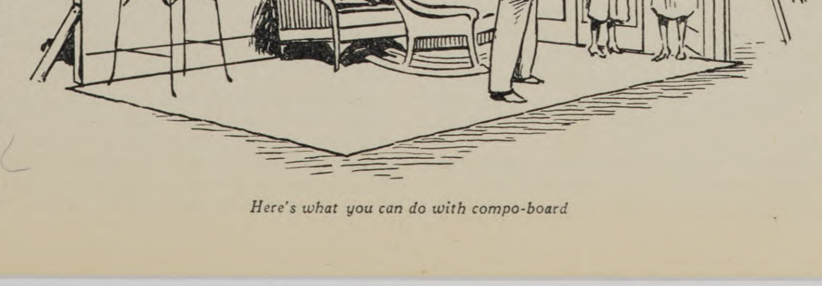
Making a room out of a garage wall

Suppose, for example, you wish to create a simple but cozy living room. If you have a window in your garage it will assist admirably. First, you decide on how much space you want to show in your living room. Then you mark that on the exterior wall of the garage. The stucco garage wall will be an excellent wall for the living room. A set of attractive and bright cretonne curtains are then hung on the outside of the garage window—if there are two windows it makes the set still better—and you have gone a long way toward making your living room.

Next take a living room rug and place it on the ground, if there is a cement driveway it will be better, and you are ready for the furniture. An attractive table placed against the wall, a couple of pictures hung properly, an attractive lamp on the table, some chairs, and there you have a living room set that will serve adequately and well for your purpose.

The cost has been nothing, unless you have to buy the curtains. for the rug, chairs, lamp and pictures can all be borrowed from your own home.

You are then ready for your actors and shooting. All you must remember is that you must be careful that the only portion of the garage to appear is that selected as the outside lines of your space desired. Also watch the front line so you won't take in part of the driveway or the garden. The illusion on the screen will be just as effective as though you had gone to extreme expense in building a set after the manner of a motion picture studio.



Here's what you can do with compo-board

There are two decided advantages in a set of this kind. One is that you have privacy, for it is in your own back yard. The other is that you can allow it to stand, and it will be in no one's way and need not be disturbed as it would have to be if you used your own living room. Then, too, if you wish to do your "shooting" in the daytime you, by the use of simple reflectors, can have all the light you need. But if you shoot at night you are in the privacy of your own property and have more room to place your lamps.

Naturally, if the sides of your garage are of clap-boards, you cannot use the garage as the wall of a living room, but such a garage will be easy to find among your friends. And, if your house is stucco you can use it instead of a garage. If you require more than one room for your picture you can use the side of the garage for one room and the end of the garage for another. If you need a third room, a simple switch of the furnishings will transform the living room into a bedroom or dining room.

If you wish to do something a little more elaborate in the matter of sets you may do so at a very trifling cost and the results will be astounding, providing you have a vacant lot on which to place up your sets. There will, of course, be more of a thrill, perhaps, for all concerned because you will be more nearly approaching the manner of the studios.

All you need is carpenterial ability, a few tools and some very cheap compo-board, and light canvas or heavy muslin. And here is how it is done.

You wish to build a living room set. First, remember that you only need two side walls. So, you decide on the dimensions, and then decide how many windows or doors you will want to show in your picture. Draw a rough sketch for your plan and go ahead. Build the wall for one side, with its windows or door, using the light compo-board. Then cover it with canvas or heavy muslin. Then build the other wall and cover it. Be sure they are well braced. Then out in the vacant lot erect the two, being careful to join the corners well.

A paint brush and paint will soon transform the canvas-covered walls into whatever color you desire. On the "floor" it will be well, unless the ground is very level and smooth, to place compo-board. Then put up your curtains, lay your rugs and place your furniture, and you have a set that can be photographed from as many angles as you can desire.

The advantage of a set such as this is that you can photograph from the inside showing action through the windows or doors outside; and if you have a beautiful garden just outside the door or windows you can do much in the way of pictorial beauty for your picture.

If you plan your set construction carefully you will be able to do much with very little set expense. For example, make your walls in, say, three sections, or "flats." Your window on one wall will be in one of these sections. If you wish to show another room, you just take out this section and replace it with another, re-arrange your furniture or change it completely and you have another room at the cost and trouble of only one new section. One important detail to remember is that you must be sure to brace the

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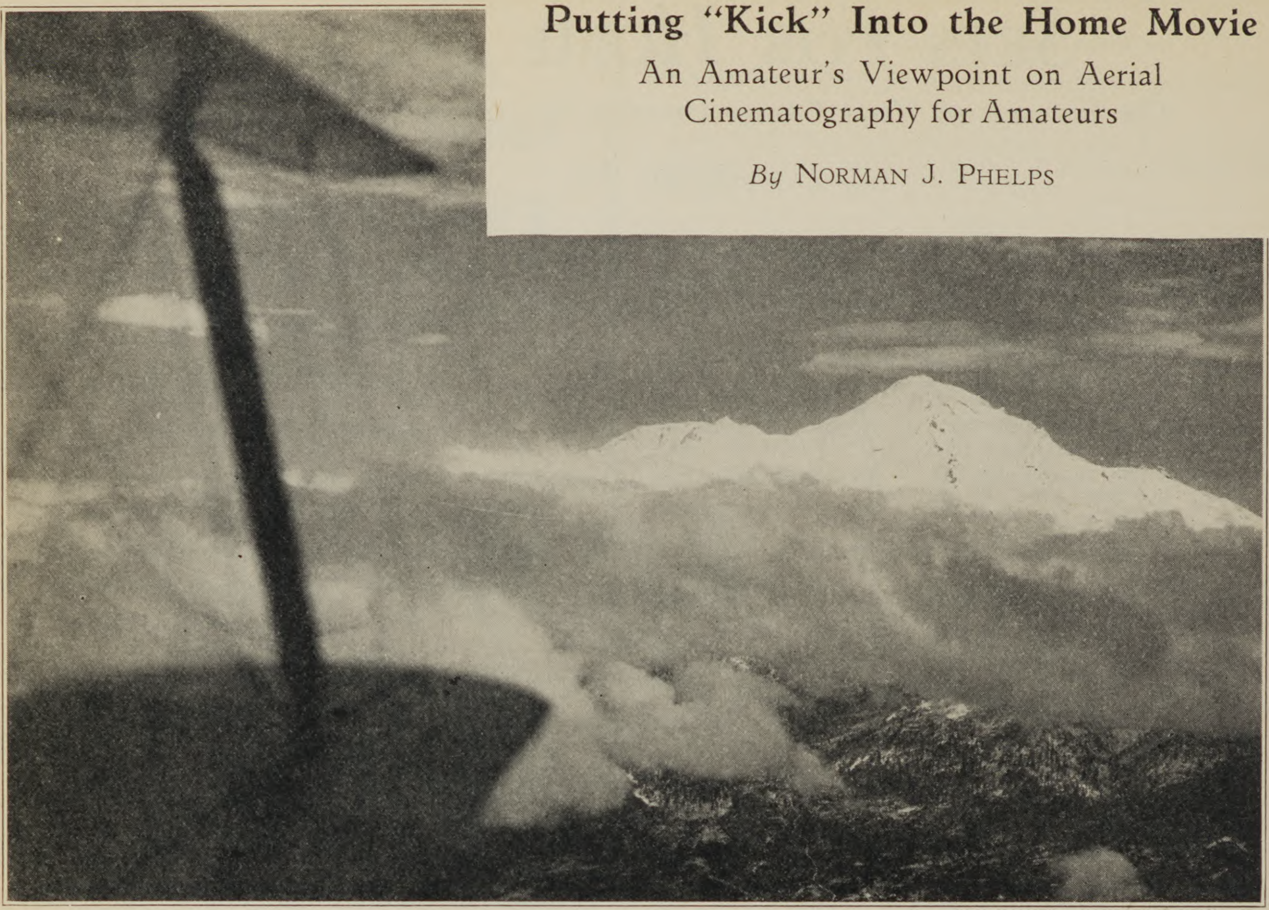
Putting "Kick" Into the Home Movie

An Amateur's Viewpoint on Aerial Cinematography for Amateurs

By NORMAN J. PHELPS



Hold your camera in such a way that you show a section of the wing as well as sky and ground.

DOESN'T he look natural?" That's the inevitable comment the instant a beautifully back lighted close-up of Uncle Jack flashes onto the screen. It's a compliment to you, of course. But it's also a remark quite frequently passed at events when an audience is gathered for reasons other than entertainment. There's no question but that the family album will mean a great deal to you in future years, but if amateur movies are to provide entertainment, we must produce pictures that furnish our audience as much "kick" as we get out of the actual photography.

Contrast the quiet smiles that greet the showing of Aunt Norah shelling peas on the back porch to the exclamations that are certain to burst forth when you take your audience up for a sojourn among the clouds. If your aerial picture is made right, you'll have your spectators falling out of their chairs the first time they go into a vertical bank—and if you have planned your picture with the following in mind, some one is certain to yell for the smelling salts before the first twenty-five feet have run off.

I don't purport to be an authority on entertainment. Neither am I posing as an expert aerial cinematographer. I'm just an amateur who loves his hobby. But I do know it's easier to provide real entertainment by photographing an *unusual thing*, than by trying to film a *usual thing* in an *unusual way*—and it's a safe bet that nine out of ten members of your friendship list can be made attentive, appreciative, and air-sick all at once if a little care is used in filming a $5, fifteen minute sky cruise over the home village.

When you go out to make your thriller, bear one thing constantly in mind: there's no thrill whatever in mere bird's eye views of the water tank or the public library. Aerial photographs of the whole town, post-card style, are on sale at all the drug stores, three for a nickle. The thing that's going to make your picture a success, is how accurately you bring the actual feeling of flight to the screen—and to your audience.

Select an open cockpit biplane and, if possible, a pilot who either has made aerial pictures before, or one who will listen to your story and fly you the way you'll want to be flown—the object of the game being, to fly in a way that the position of the plane can be constantly shown in varying relationship to the horizon and an interesting portion of ground. Unless this is done, your picture will lack feeling and there just won't be any thrill to it.

We'll assume that you're seated up in the forward cockpit all alone. It's best that you don't take another passenger with you. He'll only be in the way, and if it's his first flight he won't enjoy the kind of flying you are going to have to do. Your first shot will be the take-off. Point the camera directly toward the ground at the wheels—if you can see them. When you get on your way, tail-up, push the button and hold it until well after the wheels have bid good-bye to mamma earth and the ground diminishes rapidly as you see it through the view finder. This should take about twenty or twenty-five feet 16 mm. and should be made at normal speed. I tried it half speed but there was too much blur.

Now that we're really up in the air, you must let your audience know it. A most effective way of doing this is to begin with a nice, gentle, straight shot of the ground from about 2,000 feet. Point the muzzle overboard and straight down. When you run off three or four feet, panoram the camera up toward the nose of the plane and hold it for an instant in such manner that you have a section of the lower wing, a part of the fuselage, some ground, and about one fourth sky in the frame. At this point, your pilot has to go to work. Signal him to throw the ship into a steep vertical bank. If you hold the camera exactly as suggested, some one in the audience is sure to holler "Help!" Your picture should have at least three vertical banks in it, and a generous side slip if your own stomach will stand it.

A nice dive will help too. Point the camera right out over the ship's nose and start the music. When the dive comes, the horizon will jump up from the bottom of the frame and the effect will be all that is desired. Have it arranged with friend pilot that the dive be followed with a close spiral. If you keep the camera trained through the ship's "prop," your audience will feel just as you did. During the course of the downward spiral, you may easily produce a few more gasps if you have a six-inch lens, by suddenly cutting in a six-inch shot of your rapid progress toward the roof of the town's tallest building.

Now, if you have another hundred feet of film, five or ten more dollars to spend, and if your pilot is sure that the Department of Commerce Inspector is in Washington where he belongs, and if the clouds are real white and pretty, you might try a tight spin from above the clouds, all the while filming the ground through the numberless ragged holes in the afore-mentioned. The ground, clouds and all will, of course, twist around in merry old style on the screen. Show this shot to the unexpected guest before dinner, if the butcher forgot to send the extra lamb chop.

The long and short of putting "kick" into aerial pictures is to keep such a relationship between camera, ship, horizon and ground, that the actual movements of the plane are accurately recorded.

I have also found, at the expense of considerable film, that there are a number of things about the mechanics of aerial photography that don't occur to the average amateur who has never done aerial work. To begin with, aerial pictures that are to show ground detail should be made at double speed, 32 a second or if you're real low, 64 a second. Not because of the plane's forward movement, so much, but because of air bumpiness. Double speed with a two or four-inch lens from 1,000 to 2,000 feet gives splendid results. Use your one-inch lens and normal speed only when shooting banks, dives, etc., when the movements of the ship are more important than ground detail. For double speed I hold the ultra-speed button on my Victor about half way down, and of course the Victor has the regular 64 a second speed. I like the Victor for aerial work for several reasons other than the numerous speeds it affords. The Victor finder is a sure-shot proposition when quick lens changes are made, and the Victor motor runs 33 feet of film at one winding.

Now there's the matter of exposure, which, in turn leads to the subject of the best kind of film to use. When in the air, I have never yet been able to hit exposure just right for reversible film. 180 degree light is confusing to me, and there's not much comfort in looking through a Cinephot when your feet are pointed at the sky. So I suggest negative film. You can be four times wrong with negative and still get good pictures, and when you're paying five dollars per each fifteen minutes of flying, the extra cost of the negative-positive print process doesn't mean much. Use "pan" negative. It's best, you'll find, for clouds and for ground detail. A K2 and a K3 filter with the consequent alterations in exposure will help too.

Try a couple of hundred feet of aerial movies in line with the above suggestions. I think you'll be immensely pleased.

Hal Roach Comedies in Foreign Tongues

THE foreign motion picture markets are not to be without their quota of laugh films, according to an announcement from Hal Roach. This energetic producer of two reel comedies is the first in his field to begin foreign language production. He has already taken steps to bring out Spanish editions of Laurel and Hardy, Charley Chase, Harry Langdon and Our Gang comedies. German and other language editions will follow later.

Two new comedies now in production, a Laurel and Hardy and an Our Gang, have language experts on the set teaching the fun makers how to say their comic lines in Spanish. A scene is first enacted with the dialogue recorded in English, then immediately repeated with the words spoken in Spanish.

The selection of the language tutor was not an easy job for the Hal Roach officials. The problem was to find a teacher who had both a sense of humor and a knowledge of the language of the streets in the foreign tongue, since elegant Spanish would hardly fit the personalities of two reel comedians.

Hal Roach believes he has been successful in his search for the right person to fill this important position. Strange as it may sound, Robert O'Connor is the man who is teaching Stan Laurel, Oliver Hardy and Our Gang to say funny words in Spanish. O'Connor is the son of an Irish father and a Spanish mother. O'Connor's paternal heritage guarantees the humor, his mother's gift is a comprehensive knowledge of the Spanish language, and his own experience as a comedian at the Hal Roach Studio for the past four years, has provided him with a pretty good idea of what comedians say while engaged in funny business.

Showmanship Essential Quality for Good Projectionist

DECLARING that above all showmanship, inborn or acquired, is one of the most necessary qualities for a good projectionist, William F. Canavan, International President of The International Alliance of Theatrical Stage Employees and Moving Picture Operators, brought out the great part the projectionist plays in the picture world at a luncheon tendered him in New York last month.

Excerpts from Canavan's speech follow:

To those of us who have a personal interest in this particular subject, there is great satisfaction when we visualize the tremendous strides that have recently been made in the development of projection room practices and equipment. These recent developments have been of signal importance to the millions of patrons of the justly popular motion picture entertainment, and have given a new impetus to one of America's greatest industries.

With the coming of these vast changes in projection room practices and equipment, the members of the projectionists local unions throughout the United States and Canada are fully alive to the great responsibilities that will devolve upon them and are preparing themselves by intensive training and study, to meet the changed and changing conditions in projection problems, come what may. The projectionist is more of an idealist than a working man. He looks upon motion picture projection as a specialized art and is ever striving to improve the quality of screen entertainment even though it entails a personal sacrifice. The consciousness that the success or failure of the entire screen performance is dependent upon his skill and its application in the handling of the delicate projection equipment, has a natural tendency to keenly arouse him to sense the great responsibility of his profession. He approaches his task, not from the standpoint of a worker who is to receive a monetory consideration in the form of wages for a given number of hours of service, but rather from the standpoint of an artist, mechanically etching upon the silver screen a series of beautiful photographic images that are unfolding to his movie audience a visual impression of a beautiful story told with the aid of his mechanical pen.

The introduction of sound presented a series of problems that were entirely new to the projection field. To begin with, the sound equipment had only been subjected to superficial laboratory tests prior to its installation in the theater. These tests had been conducted under uniform and ideal conditions, by technicians who had developed a pace with the sound equipment. But theaters could not be re-constructed so as to make them ideal for the new sound installations. The physical conditions obtaining in many of the theaters were such that it was next to impossible to achieve the desired results.

After the installation was made, the responsibility of operating and maintaining the sound equipment became the duty of the projectionist who had little or no knowledge of the complicated device, aside from a few hours of operating instruction. This unfamiliarity was not due to his indifference. There had been no opportunity to secure the technical information necessary or to prepare himself for this new responsibility. From the outset it was apparent there would be trouble. Many changes had to be made, before the sound equipment measured up to the exacting exhibition requirements of the modern motion picture theater. The projectionists who pioneered the introduction of sound have every night to feel a great satisfaction in the contribution they have made in the development of this epochal achievement. I feel one may safely say that the problems arising through the introduction of sound were far and away the most difficult with which projection room staffs had ever been confronted.

The men who have solved the problems in a practical and highly satisfactory manner are to be congratulated. They are deserving of the highest commendation from the entire industry for this splendid service.

It is a pleasure to note that the better class of theaters have at last come to a realization of the importance of the projection room and are furnishing adequate and modern projectors and equipment, which enables the projectionist to produce proper screen results. It is to be regretted that many theatres are still using inadequate and antiquated equipment. Good projection requires good projectors. Poor screen results will do more to injure a theater's reputation and patronage than any other single factor. Bad projection and good business are never companions. Show me a theater where proper projection standards are not maintained, and I shall show you a theater where business is in the same category as its projection.

I want to caution all of you who are projectionists against ever being satisfied with projection mediocrity. There is always room for improvement, no matter what has been accomplished. Perfection in projection has not been achieved, irrespective of the splendid progress that has been made. Let all of us who are interested in the advancement of the science of motion picture projection rededicate our purposes to the continuance of the struggle for better projection, a struggle not rooted in selfishness: an effort not in the interest of personal gain, but a contribution to the motion picture industry through co-operation and good will.

Portable Mixing Booth

PORTABLE mixing rooms for big settings are a new development of talking motion pictures. Except that they are larger, they are identical with the sound-proof camera booths in structure and appearance. They can be moved from place to place on the sound stages or shifted from one stage to another.

The booths are mounted on pneumatic tires and can be moved to any desired spot on the sets. They are fronted with sound-proof glass windows similar to those of the camera booths. If he so desires, the director may enter the mixing booths and hear the voices of the players as the microphones hear them. At the same time he can be watching the action from a point as advantageous as his own directorial chair.

It is in the mixing room that the sound volume is controlled. The voices of the players and other sounds are caught by microphones and transmitted to these rooms where the mixer controls their volume, amplifying or reducing as may be required.

Paris—French musicians at a meeting here voted not to accept employment in sound or talking pictures except on their own terms.

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Multicolor

(Continued from Page 23)

for his own black-and-white scene, and then shot my color right beside him. It was on an average-sized set, and I remember he used just 800 Amps. He was sure that I'd underexposed, so we made another shot of it with a 25% increase in light; then, just to convince him. I made another with 25% *less* than the original load. When we saw the three on the screen he was sold, for the first shot was perfect—just as well exposed as his own black-and-white shot made at the same time. The second shot was plainly over-lit, and the last was just a bit underexposed. That convinced him; he didn't try to find any more faults with Multicolor. I've kept trying myself, but I haven't found any: I've worked with it under about every sort of condition, too.

"In *The Great Gabbo*, though, we had only our earlier film, we worked right alongside the black-and-white cameras. At Fox's we've worked in Movietone, right close to the mike and people, with only one of their 'horseblankets' thrown over the camera —and no camera noise. I've worked in booths and out, with Inkies and Arcs, on studio stages and in the desert—and still I've had no trouble with Multicolor.

"I've had difficulties with some of the art-directors and executives, though. A lot of them are so eager to get the best results from their color photography that they overload their sets with color. It's a natural impulse, but one that doesn't work well in practical color work. Any excess of color contrast seems unnatural on the screen, for you will observe that nature's colors are never glaring. If these people would only remember that, and decorate their sets as quietly and tastefully as they would their own homes, we could give them much better results.

"Probably the greatest single thing about Multicolor is the fact that it needs no special cameras. Most cameramen are carrying individual investments from $5,000 to $10,000 in cameras and equipment—and an estimate of $500,000 for the total amount tied up in the industry's cameras is very conservative. Any innovation that will make it necessary to discard these expensive instruments is hardly a benefit to the industry, and certainly a blow to the individuals. Multicolor does not do this, for not only can Multicolor be shot in any existing camera, *but it can be shot without making any change which will in the least effect its value as a monochrome camera!* In fact, recently I went out to shoot part of a two-reel talking act in color, and after the color sequences were finished I shot the rest of the picture in black-and-white *with the same camera, untouched.*"

The present policy of Multicolor Films is to supply, for the present, the special magazines and films needed, with an expert color cinematographer to handle the photographic direction with respect to color. To this end they are training a corps of expert color cinematographers. In due time, however, as the knowledge of the peculiarities of color camerawork becomes more general, this latter service will become unnecessary, and Multicolor cinematography will take its place on perfect parity with today's accepted monochrome.

Sets for Home Movies

(Continued from Page 33)

walls well so they will neither fall down nor waver as you are photographing your action. Also, when setting up your camera be very careful to see that there is sufficient portion of the set outside the image seen in the finder. Otherwise you may discover braces or ropes or other props on your screen and the illusion will be spoiled.

After building one of these sets you will find that you can do many things with it and picture making will become a real delight as you see your results on the screen.

Exposure Problems

(Continued from Page 30)

filter. It is suggested that the subject of exposure without filters be mastered first and then no difficulty will be experienced when filters are used.

In no other phase of movie making is the old saying "practice makes perfect" true. Correct exposure is merely a matter of practice. Keep a record of the exposure given to your pictures and in a surprisingly short time you will find that you have mastered the subject of exposure.

Your Makeup Problems

By MAX FACTOR

[*Internationally Known Authority on Makeup*]

DEAR MR. FACTOR:—I am a brunette with brown eyes, dark hair and olive skin. Two weeks ago I blondined my hair, the result is that my make-up makes me look grotesque. What can I do?

L. P.,
San Diego, Calif.

ANSWER:—To avoid a clash in the color harmony of your make-up, I would suggest that you carry out a much lighter complexion with your make-up. Nature has its own scheme of giving the complexion a harmonizing combination of colors, and this is the standard by which our judgment is governed. Now that you are a blond I would advise you to use a natural shade of powder in preference to any lighter or darker shades. Blend a brown eye shadow over the lids and use a medium lip rouge, Blondeen dry rouge for the cheeks. This will give you the proper color harmony for your change.

MY DEAR MR. FACTOR:—I recently read in the Los Angeles Examiner an article which said that 47 per cent of the women in the United States were neither blondes, brunettes or redheads—that they were Brownettes. That interested me greatly as I am a brownette. I have grey eyes, brown hair and my skin is medium in color. Will you give me your idea of just what I should use to get an effective make-up.

M. C.,
Dayton, Ohio

ANSWER:—Use olive face powder, medium lip stick, grey eye shadow and raspberry dry rouge.

MY DEAR MR. FACTOR:—I am of Spanish extraction and while my hair is blue black and my eyes are very dark, my skin is light and creamy and not olive. You have heard of the Spanish girl of dark skin and blonde hair; I am just the reverse. Will you please tell me how I can overcome this peculiar color scheme and reconcile my complexion to my hair and eyes?

L. M.,
Detroit, Mich.

ANSWER:—I think that a very fair skin against a brunette background is rather attractive and if you use a natural powder it would not change your complexion any and harmonize with your own complexion. I would complete your make-up by using a brown eye shadow over the lids, a dark lip rouge and a raspberry dry rouge for the cheeks.

I am a red head and freckle easy. What can I do to do away with these freckles? Is there a foundation cream that will overcome the freckles so that my make-up can be put on over it all and eliminate them?

LAURA G.,
New Rochelle

ANSWER:—During my experience I have not found any freckle cream that would remove freckles entirely; however, I suggest that you use a powder foundation that will blend between the shade of your freckles and your natural skin. The powder foundation when properly applied will conceal the freckles effectively.

DEAR MR. FACTOR:—Do you design wigs to suit the wearer's personality? I am very blonde, which of course makes it difficult for me to wear all colors on the stage, successfully, and so I

(Continued on Page 43)

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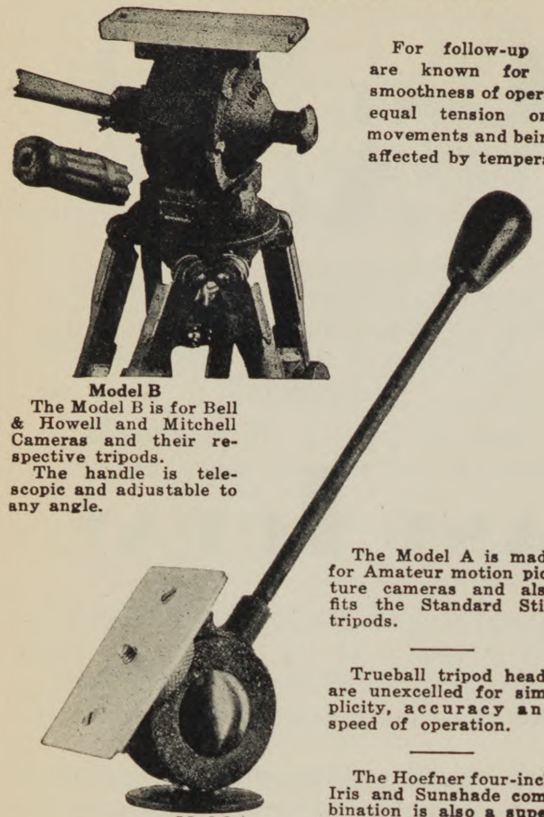

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Douglas Shearer, A. S. C., Lists Sound-Projection Faults

IN ORDER to establish a criterion as to "noises" caused by faulty projection of sound-films, Douglas Shearer, A. S. C., Recording Engineer for Metro-Goldwyn-Mayer recently made an exhaustive demonstration for the members of the Academy Sound Classes. Single reels of two recent pictures, Joan Crawford's *Untamed* and Lawrence Tibbett's *Rogue Song*, were printed up with the deliberate idea that they were to be maltreated in every possible way. Further, the projection machine through which they were to be run was loosened in every manner which might cause extraneous sounds.

The result was an amazing series of unpleasant noises and other acoustic flaws which very well illustrated what can happen to a perfectly recorded picture if the projection is not equally perfect. Following the experiments, Mr. Shearer prepared the following chart of the noises due solely to bad projection.

Sprocket Noise—Caused when the film pulls over to the left in the projector, allowing the exciter lamp of the light-ray reproducing system to play through the sprocket holes of the film as well as the sound track. The noise is a rather high-pitched buzz, somewhat like a busy door-bell.

Flutter—This is a pulsation in the recorded tones. It sounds as if the speaker is gagging a bit over a mouthful of mush. It is caused by too long or too short loops in the projection machine, or loose pads on the track guiding the film. These things cause both picture and sound track to move in and out of focus.

Frame Noise—The opposite of sprocket trouble. Caused when the film is pulled in the machine too far to the right, running off the sound-track onto the picture itself, playing, so to speak, the picture and the dark spaces between the frames. Sounds like a motorboat at high speed.

Motorboating—Same as Frame Noise.

Overspeed—When the speed is suddenly increased beyond the normal of 90 ft. per min. (33 1-3 R.P.M. for discs), the high frequency sounds are emphasized at the expense of the lower ranges. In other words, the great basso, Chaliapin, would sound like a soprano under excessive overspeeding.

Underspeed—When the projector is suddenly slowed down the reverse of the above occurs. The lower frequencies are emphasized, and Galli-Curci would sound like Chaliapin.

Dirt Noise—Film should always be carefully cleaned after each running, but sometimes an operator is careless. When this happens, specks of dirt form on the sound track. These specks cause variations of sound which are manifested in many ways—squeaks, whistles, fire-cracker noises, etc.

Loose Exciter Lamp—When the exciting lamp of the light-ray sound reproducing system becomes loose there is a distortion of sound, making it hard to keep the attention concentrated.

Gear Noise—Noise recurring at regular intervals, dum-de-dum, etc., can usually be traced to loosened gears in the projector.

Blooping—This is a sudden "plop", usually caused by a bad splice between sections of the film. This can always be avoided by correct splicing, and properly blocking out the spliced patch in the sound track.

Insulation Noise—Some theatres have not yet installed the heavier tripods and insulation pads required for sound reproduction. The amplifying tubes and the photo-electric cell are very sensitive to jar. Sudden "whack" noises from the screen are generally traceable to trouble caused by vibrations when the projectionist walks across a booth in which the insulation has been badly done.

There are other noises which can be caused by accidents and by faulty handling of the equipment, but these are the major extraneous sounds which annoy theatre-goers. All of these sounds can be eradicated. Sound reproduction is a carefully developed science and variations from perfection seldom come from any reasons except human carelessness. When a sound picture leaves the studio, it is as perfect an example of fine recording as the skill and care of the production personnel can make it: if it is properly cared for and carefully projected it should also give perfect reproduction.

Richmond Public Schools to Continue Educationals

Richmond, Va.—Educational films are to be shown in the public schools of Richmond throughout the remainder of the 1929-1930 session, it is announced at the office of Albert H. Hill, superintendent. "Meat From Hoof to Market" and "America's Granary" are the titles of the pictures shown recently. Motion pictures are also show nin many other schools in Virginia. Radios are also being used to aid educational work in the state.

Multiple Exposure

(Continued from Page 4)

For the disc system, lap-dissolves still present a serious problem. Maintaining proper synchrony is difficult, and it is highly improbable that the two scenes could be recorded directly over each other successfully. Therefore the general practice of organizations using disc recording exclusively is to make all lap-dissolves and fades with the optical printer. However, where the equipment permits, the most likely way to secure these effects without the use of 'dupes' is through the use of a film-recording process, and subsequent re-recording onto the disc. Another possibility is the use of two separate discs: the first being used until the fade-out is complete—the volume being reduced electrically—and the second being used with the second scene of the pair; the photographic film having been rewound to the original starting-point of the first scene, after which it is run, with the shutter closed, synchronously with the new record, to the point at which the second half of the lap begins, whereupon both picture and sound are faded in, and the scene continued as usual. The two partial records can then be processed, and re-recorded onto a third and final one. A third possible method is quite similar as regards the making of the first record. This is then processsed, and played through a loudspeaker on the set, while the camera runs, with shutter closed, synchronously with the record, which is being re-recorded by properly placed microphones. At the proper place, the camera shutter may be opened, and the other microphones about the set gradually energized to record the action of the second scene.

A variant of this method has been used in the recording of large scenes, especially those representing theatrical performances. The vocal part of the scene is first recorded, under acoustically perfect conditions. The film or disc of this record is then processed, and thereafter played through a loudspeaker and re-recorded while the photographic part of the scene is made, the actors 'mouthing' their lines and songs inaudibly. This combination enables these somewhat difficult scenes to be photographed and recorded much more satisfactorily than could otherwise be the case.

Similarly, in a recent film wherein the star was required to play a dual role, this arrangement enabled him to time his actions perfectly, and to give himself his own cues. Photographically, the scene was made by the familiar 'split-screen' methods, whereby the picture-area is divided in two, first one half being photographed, and then the other. Strangely enough, the addition of dialog simplified the procedure, instead of complicating it. Formerly, the action had to be timed by counts, which, for any degree of precision, was rather involved and exacting—and at times highly disconcerting to temperamental players. In this case, however, the actor was able to time and cue himself. The first half of the action was photographed and recorded quite normally. Then the sound record—in this instance a disc—was quickly processed, and the photographic film turned back to the original starting-point. When the record was ready, it was played through a loudspeaker on the set, before which a microphone was hung. Both the camera and recorder were synchronized with the phonograph, and the remaining half of the scene was made with the phonograph not only supplying the cues to the actor, but also making the dialog complete on one record for both halves of the scene.

Similar double-exposure work has been done in at least two instances in the Variable Density process, using both light-valve and glow-lamp recording. In the first case, the scene was comparatively simple, requiring one character to converse with another, played by the same actor, without a great deal of action. Photographically, of course, it was easy, the more so since one character remained practically motionless throughout the scene, presenting his profile to the camera. The sound was not difficult, either. Between the speeches of the first character, the sound-track was left blank, by closing the lens of the recording light. This first record was then processed, and played back to the actor as a cue for his speeches in his second character. However, instead of using a loudspeaker and re-recording, the actor wore a radio earphone on the side away from the camera, and the two partial records were combined later, in the printing.

In the other case, where the glow-lamp method was used, the two halves of the scene were made in quick succession, with a single sound-track. To avoid exposing the film between each character's speeches, the lamp was withdrawn, and replaced at the proper time. As there was no partial record to play back to cue the actor, and as counts were obviously impossible, the cinematographer memorized the entire scene, and devised an elaborate system of lights by which he could signal both actor and recorder their respective cues. In this case again, he had to take into account the lag in their response. Aside from this, his task was of particular interest because of the nature of one of the doubled scenes, in which the actor, having beaten himself in a fight, knelt over his own prostrate form, and talked with himself. The effect was achieved by exact and skillful photographic matching of the actor's head onto a double's body. The scene was photographed and recorded three times—and each 'take' was perfect!

So far as is known, while such double-exposure work is equally feasible with the Variable Area systems, none has so far been attempted, as no need for it has happened to arise in the course of the regular work of the studios using that system.

Thus, however, it will be seen that even in the brief space of a year, studio technicians have so far mastered the sound device that they can successfully attempt most of the cinematic effects and tricks of yesteryear in today's vocal films. Had they achieved this under the perfect conditions of laboratory research, they would be deserving of the highest praise, but that they have done so instead under the hurried and nerve-wracking conditions of scheduled commercial production adds incalculably to the glory of their achievement.

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Producers and Technicians Join to Solve Picture Problems

A CLEARING house for technical information and research among the Hollywood studios has been set up in the Academy, it was also announced, through a joint committee of producers and technicians which is sponsoring co-operative studio effort on non-competitive subjects. The committee is headed by Irving G. Thalberg and includes M. C. Levee, William Sistrom, Sol Wurtzel, Walter Stern, H. Keith Weeks, Fred W. Beetson, J. T. Reed, Nugent H. Slaughter, J. A. Ball, Gerald F. Rackett, and F. E. Pelton.

Tests and classification of the best materials for sound picture sets, an improved cover to silence the camera, and investigation toward a silent arc light are the first projects undertaken by the committee.

"The need has been growing for a clearing house of information to benefit the whole production industry," committee chairman Thalberg stated. "Studios have all been meeting approximately the same problems in connection with sound pictures. They have been struggling with them individually, duplicating the expense and effort of research. This committee, through the Academy, will sponsor the collection and dissemination of information on technical progress made in different studios that has general application. This is apart from production competition, as competition among studios is properly on the basis of quality of product and not on making more expensive the general tools that all use."

Academy committees are working out a standard for release prints to improve projection in theatres and are studying variation in screen illumination. A recommended practice for correlation of camera and projector apertures was recently adopted by all the studios.

When the microphone first came to Hollywood picture stages the cameras were locked into cumbersome soundproof booths. Smaller individual hoods, "blimps," and "bungalows" have gradually superseded the original "iceboxes," but the most efficient way of keeping the camera noise from the microphone and at the same time restoring the camera's mobility has yet to be devised. The Academy's joint Producers-Technicians committee will sponsor development of a better cover for the camera to be used in all the studios.

Construction of sets from materials which will photograph well and not distort sound has been a major studio problem. Data is now being collected by the Academy on behalf of the committee. The Bell Telephone Company Acoustic Laboratory will collaborate in making tests to provide a wider range of materials suitable for set construction.

Television Coming

WITH the strides being made and in prospect, television should be pretty well perfected in 25 years, Elmer E. Bucher, executive vice president of RCA-Photophone, recently told the New York Co-operative Club. The combination of talkers, radio and television in the home is not far off, despite the fact that television is not yet well developed, he said. A great number of engineers now are devoting time to television, Bucher declared.

Color in Films Will Improve Feminine Dress

THE advent of color in motion pictures promises to make more tasteful dressers of America's women, according to H. M. K. Smith, costume and color expert of Paramount. He asserts that while even in the smaller towns our women, thanks to the influence of films, are today just as well dressed as those in the cities, they are still found lacking in "a practicable appreciation in color. This the motion picture is now certain to teach them, for the color wave is coming just as definitely as the sound wave came a year ago," he adds.

$2,500,000,000

(Continued from Page 14)

last six weeks, producing companies have rewritten 3,800 contracts with small independent exhibitors, who bid more than they could afford for sound pictures, the revision amounting to a cash refund of $1,300,000.

"Scientists of repute are now agreed that the American motion picture is a positive and vigorous deterrent to crime.

"The industry contacts with more than sixty religious, civic and educational organizations; we send to a studio relations committee all thoughtful and specific comment on pictures, and we make available previewing facilities to representatives of responsible public groups."

Progress In Studio Illumination During 1929

By Elmer C. Richardson

WITH the closing of the year it is of interest to note the progress made in the field of incandescent lighting in the studios. This type of lighting has been in use on a production basis approximately three years. At the time it was introduced the sound pictures were just entering the production stage, with only one studio actually operating in that field.

While the use of "inkies" was well under way in the last year of silent picture production, their use received a tremendous impetus when the studios began to make the "talkies." There were several factors contributary to this: Pan-chromatic stock became almost universally used for negative film, and with this stock the "inkies" were required for good separation of the color values. The quiet operation of the incandescent equipment simplified the whole problem of using the microphone, and they were lifesavers to the producers, who at that time had plenty of troubles on their hands without considering lighting problems. Fortunately, the first cost of equipping the studios with the new lighting system was only a fraction of the cost for equivalent arc equipment. The "inkies" offer so many advantages that today the majority of sound studios have adopted the new type of lighting.

The manufacturers of Studio Lighting Equipment have been "upon their toes" and as the needs for particular types of lamps have developed they have been quickly supplied. Today, Mole-Richardson, Incorporated, the pioneers in this type of equipment, are able to supply a complete line of "inkie" equipment which fills practically every studio demand.

A year ago the sets used in sound pictures were small and at that time very few powerful globes of 5,000 and 10,000 watts were in use. For back lighting the MR-Type 200, 18" Sun Spots were most commonly used. The year 1929 opened with a "bang." Numerous producers began to enlarge their sets. Full stages were occupied with single sets filling the entire space. The use of MR-Type 224, 24" Sun Spots in quantities such as two hundred, three hundred, and even up to five hundred has become common practice in lighting these large productions.

For the colored motion picture the "inkies" have been a boon. The light they furnish is of constant value and the beauty of the color reproduction obtained with incandescent lighting has started an insistant demand on the part of the theatre patrons for the magnificent form of entertainment which the colored motion pictures afford.

The actual per cent of the cost of producing sound motion pictures which is chargeable to the lighting, is relatively small as compared with the other production costs. Savings made in current consumption, the cost of either carbons or mazda globes, the first cost of equipment for either arc or incandescent illumination, or the actual labor cost of rigging and shooting; are not the most important economic factors, although in such costs the "inkies" show that considerable savings are possible. The important items to consider are: The quality of the photography produced; the effect of the lighting system upon the sound recording; the economic saving made possible by allowing the directors, actors, cinematographers, and auxiliary workers to function without the interruptions resulting from faulty operation of the lighting equipment. In meeting these qualifications the "inkies" have given a good account of themselves.

The work of camera men who have photographed using filament lamps for illumination has received the highest praise from exhibitors, critics, and the general public. Indeed, never has the public had such offerings as were available at the opening of the exhibitors' season this fall.

Sound recording, aided by lack of extraneous noise, has achieved a tremendous advance over the recording of a year ago.

Directors have been able to extend their "takes." Now the limitation is the capacity of the camera magazine, rather than with the short period of time during which the arc lamps would operate before flickering or blinking interrupted the shooting.

Of course no one would say that all of these advances are creditable to the use of incandescent lighting. Much credit is due to the makers of pan-chromatic filament stock, to the development of cameras especially suited for use in making the sound pictures, to progress in laboratory practice, many vital improvements in the recording systems, detail attention to improvements in make-up, and to progress in the operation of the entire sound equipment. These factors have contributed greatly to the production of the finest entertainment ever offered to the public for their admission fee.

The problem of 1930 is to make the progress in the coming year overshadow that of 1929. Technical departments all throughout the industry will rise to the occasion and *deliver*.

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All Wide Film and All Color Predicted

TALKING pictures in colors will crowd black and white films off the screen. Double width films on a screen that fills the proscenium arch is the entertainment outlook for the near future. The stage itself will not be eliminated, but will be aided by pictures. These predictions form the basis of comments made by Jesse L. Lasky, vice-president in charge of production for Paramount, as the result of a survey of the field made at the end of the first year during which all-talking pictures have been solidly established.

"The public likes to see color instead of the black and white," he declared. "Technicolor has so improved its process that there is no such thing a eye-strain any more and added progress is being made daily.

"The production and presentation of musical plays on the screen cry for color. I might offer as an example our current Technicolor picture, 'The Vagabond King.' In this, color is used to heighten dramatic moments and to put the audience in the spirit of the lighter scenes. Color has a genuine dramatic value, and the use of it dramatically is the first principle of showmanship. For instance, black is impressive for a sombre scene and high tones are vital to happy scenes.

"Color," he pointed out, "ties it with the enlarged screen, giving spectacular effects never before attainable with pictures. Experiments are now being conducted by Paramount for the further use of the large screen, adding that this company was the first to present the double-width film on the full-stage silversheet when 'Over the Top' was offered recently in New York.

"With the enlarged screen," Lasky said, "will be double-width film. This combination of photography and projection presents a very beautiful and distinctive quality, and a stereoscopic effect.

"The magnascope was the first step. That simply was a lens that magnified the ordinary picture and was used in certain localities for the showing of 'Old Ironsides' and 'Wings.' The new process, the magna-film, takes a photographic negative twice as wide as the standard negative, bringing everything into comparative close-up."

"With the arrival of talking pictures," Lasky continued, "the spirit of adventure has taken hold of the screen industry. Every unit is developing the mechanical possibilities to the last degree, and the next ten years will be years of advancement and progress far beyond our dreams. This spirit will extend itself to the speaking stage for I believe that the talking screen will reach out and stimulate that.

"Eventually," he said, "the dramatic stage will be subsidized by the motion picture industry. Certain dire predictions that the stage will disappear as the result of the coming of sound to the screen are wrong. The stage will remain because the public wants it. This is fortunate, for it will be a training ground and proving field for the sound films of the future."

Another current change which he noted was the change in the public attitude from mad jazz to more sedate syncopation.

"The jazz age has ended," he said. "We are going into frank age, the normal change that always comes in everything, whether it is music, literature, plays or pictures."

Technicolor for Europe

DR. HERBERT T. KALMUS, president of Technicolor, accompanied by Mrs. Kalmus, have gone to Europe to complete negotiations for construction of plants in England and on the continent. The first laboratory is expected to be built in or near London, and the second in Germany, probably Berlin. After a sojourn in London, Dr. and Mrs. Kalmus will visit France, Germany and Italy.

Make-Up Problems

(Continued from Page 37)

have considered having a dark wig if I could get one which looked like it belonged to me. Also, could you do this from a photograph?

V. M.

ANSWER:—We want to advise you that we create and design wigs for every personality known to the stage and screen. This cannot be done successfully from a photograph. Hair, in order to appear like it is part of you must be in harmony with the lines of your contour—your head must be measured very carefully so that the wig will be shaped correctly. Also the color must be in harmony with your complexion.

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Silent Pictures to Remain

THERE will always be room for clever silent pictures, with stories that stimulate the imagination," declares Col. E. A. Schiller, vice president and general manager of Loew's Inc. "Silent pictures will draw patronage on even terms with talkers when they have stars of comparable popularity with those of the audible films with which they may be competing," he continued.

Machine for Cutting Records

(Continued from Page 8)

relative response of the recorder when measured at the end of the stylus arm and when measured at the monitoring coil position are practically identical.

6-A Flayback Reproducer

The 6-A playback reproducer is a device for playing back from wax engravings for purposes of inspection and observation as to the perfection of the work. It is not intended that the engraving so used shall be preserved for making of finished records, although this has been done at various times with reasonably satisfactory results.

The transmission characteristics of the 6-A reproducer have been described in literature previously referred to, but no detailed description of the device has been given. Briefly, it may be described as a balanced armature electromagnet device in which an armature, mounted on a steel diaphragm, is free to rock about a diameter as a pivot, under the influence of the needle-driving member. Wings extend laterally from the amature in such a way as to prevent the diaphragm assembly from moving in the characteristic diaphragm or piston manner. A motion of the armature in the magnetic field causes the induction of a voltage in the windings surrounding the inner pole tips, which induction is proportional to the velocity of the armature and is the sole function of the reproducer device. One of the features of the A-6 reproducer is the oil damping, provided to prevent the armature velocity and the needle point impedance* from rising to relatively large values for frequencies at, or near resonance.

From a transmission point of view, there are two important considerations that must be met in order that the playback reproducer may be considered satisfactory. These are: first, that the device shall be capable of tracking the wax groove without destroying it to the extent that the reproduced sound do not faithfully represent the recorded material; and second, that the voltage, developed by the device, shall be proportional to the velocity of the record groove for all frequencies of interest.

The 6-A reproducer may be considered as a structure analoguos to an electrical circuit of the form shown in Fig. 8 to which a constant current is supplied by the record groove. Assuming that the various constants in the figure are the equivalent values measured at the needle point, the two conditions above may be stated mathematically as follows:

$$\frac{vm}{v} = \frac{S}{(S+S_d-w^2m)+jRw} = \frac{1}{C} \qquad (2)$$

$$Z^* = S\frac{|(w^2m-S_d)-jRw^|}{Rw^2+jww^2m-(S+S_d)} < \frac{EA}{v} \qquad (3)$$

Where E is the maximum permissible stress of the wax, A is the area of the bearing surface of the needle in the groove and C is a constant. Assuming that for any frequency of interest S is greater that w^2m, it is obvious from equation (2) that will be maximum when Sd is negligibly small in comparison with S.

It is of course impossible in a structure of the type shown, to satisfy equation (2) to the extent of making C absolutely constant; but for some limiting value of C, it can be shown on the above basis that the natural frequency of the device when critically damped is

$$f_o = \frac{\sqrt{\frac{S}{m}}}{2\pi}\sqrt{C-1} \qquad (4)$$

It can be shown that the response of a structure as shown on Fig. 10 will decrease rapidly after the natural frequency is past, and therefore, that the natural frequency should be at, or near, the upper limiting frequency of interest. It will also be clear (from equation (4)) that S should be made as large and m as small as possible.

From Fig. 8 it is evident that in S, only the needle stiffness component (S_n) is under the control of the instrument designer, or that the value of S may vary throughout wide limits, depending upon the stiffness characteristic of the record material. That the stiffness of the needle used in the 6-A reproducer is large, in comparison with the stiffness of the wax, is indicated by data to the effect that the resonant frequency of the device on hard records is about four times as great as on wages. It is therefore quite probable that the factor S in equation (4) is about as large as it can readily be made.

The alternate method of obtaining a high natural frequency by reducing m to a minimum can be accomplished in either of two ways: by actually reducing the amount of material used, or by disposing the material in such a manner as to offer a minimum impedance to motion of the needle point. In regard to the amount of material used, needle of the 6-A reproducer is a hollow conital structure, the walls of which are about .002" thick, while the iron use din the vibrating system has been reduced to the minimum require dto carry the flux. Further reduction in the needle wall thickness would probably be impractical, and further reduction in the amount of iron would necessitate a corresponding reduction in the output voltage or would result in an impure voltage wave. As to disposition of materials, the driving needle has been designed as an impedance stepdown transformer of such a ratio that efforts to further increase the ratio are not successful on account of the increased amount of needle material required. The mass of the diaphragm an darmature contribute only a small per cent of the total impedance effective at the point.

So far as mechanical impedance of the reproducer is concerned, there probably is a considerable variation in the elasticity of waxes available at the present time, and the only safe procedure is to make Z equation (3) as small as possible. For the condition set up for equation (4) the needle point impedance for different frequencies may be expressed as

$$Z_{min.}\, f = \sqrt{mS} + j^{w}{}_{m} \qquad (5)$$

$$Z_o - \tfrac{1}{2}\sqrt{mS} - j\frac{S}{O_w} \qquad (6)$$

Where Z min. f refers to the impedance at minimum frequency of interest and Z, is the impedance at the natural frequency, which as brought out should be the impedance at or near the maximum frequency of interest. It will be obvious from these equations that the impedance approaches the limiting values of 2VmS and $^{1}/_{2}$ VmS as the two limiting frequencies are approached. It is therefore clear that reduction of m in order to increase the width of the response band is also effective in reducing the impedance of the vibrating system. From equations (5) and (6), and certain mass and stiffness data available, it appears that the impedance of the 6-A reproducer, throughout the band of frequencies of interest, might be as great as 1200 dynes sec./cm., which for a velocity of 4 cm./sec. is equivalent to a lateral force of approximately 5 grams against the wax walls. It is of interest to note that the effective weight of the reproducer on the bottom of the groove should be of the order of 5 to 15 grams in order to obtain satisfactory tracking, and that for this weight the bearing surfaces of the needle in the groove are such that the ratio of lateral pressure to vertical pressure may vary between limits of 1 and 5 depending on the setup. It is to be expected therefore that any trouble of tearing the wax is probably due to excessive lateral pressure. For this reason, it might be desirable to cut the playback waxes at a somewhat lower level than the waxes that are to be used for pressings. This would also reduce the required weight on the bottom of the groove. With waxes cut at normal recording levels, however, we have found it possible to obtain satisfactory tracking with a weight on the needle point of as little as 5 grams, and with such a setup it is possible to play a wax several times without a noticeable change in quality or noise.

In connection with the question as to the proper effective weight of the reproducer on the bottom of the groove, may we call attention to the method by which the weights used were determined. It consists in balancing the device so that the needle point just barely clears the surface of the wax, after which, a weight of the proper amount is placed on the reproducer directly above the needle. The scheme is reliable and convenient and we see no reason why it should not be used in the recording field.

New Disc Adopted by Watson Television Device

At the suggestion of P. F. Pfeil, of Graf lens division of the QRS-DeVry Corp., a new and improved television disc has been adopted by Albert H. Watson in his television apparatus. The disc, which reflects the image to the audience, as originally designed by Watson, requires 48 concave mirrors, each separately adjusted and attached by three screws. The individual adjusting of the 48 mirrors was accomplished by forcing the mirror on a slitted edge of the disc, suggested by Pfeil, down into a cam arrangement below, thus automatically giving the necessary increased tilt to each of the successive mirrors.

Talking for Pictures

(Continued from Page 13)

educational character. Of necessity, the films must have enough action to carry it without the excessive use of sub-titles, otherwise, the audience tends to lose interest with the result that more harm than good is achieved. The films are shown during meetings of organizations, women's clubs, school clubs and assemblies, and whenever requested by persons residing in the Los Angeles County health department territory.

The most significant limitation to progress with the use of silent films is the amount the public will "take." If health education is desired by the people, they feel it can be obtained from books, instead of incomplete titles hurriedly read from the screen.

The advent of talkies in public health has more than trebled the value of the use of motion pictures and has increased its scope by more than sevenfold. Almost every one of the scores of phases of health can be recorded on film and projected at will with little initial expense in comparison to the costs of securing high salaried physicians, surgeons, and specialists to speak at lectures and meetings. Indirect instruction may be gained in personal hygiene; the early detection of disease or physical defects; prevention of lowered physical resistance; the maintenance of balanced diets; proper sanitation; prenatal, infant, child, and maternal hygiene; food and drug laws; industrial hygiene; nursing care; and many other subjects which, generally, are little known except among skilled technicians.

The extreme value of health education has been recognized by national and international authorities as tremendous savings in terms of dollars and the prevention of suffering and poverty. Figures compiled by United States Surgeon General Hugh Cumming show that there are at all times in the United States more than one million persons incapacitated by illness, most of which is preventable. The economic loss from this situation is estimated to be over one billion dollars when the cost of medical care and the loss of earning capacity is computed. The application of modern public health and an adequate health education progress throughout the United States would cost only one-fifth of this amount—twenty million dollars a year, with constantly decreasing cost of maintenance with time and with increasing value obtained. Approximately 70 percent of the school children in the United States are handicapped by physical defects, many of which are unsuspected and remediable. When the cost of consequent impaired efficiency of the school system of the nation is computed, it is found that many more thousands of dollars are wasted each year.

More than 50 percent of the population of the United States reside in rural districts or communities. This means that sixty millions of people living in outlying or remote areas must be reached by a health educational program which is inexpensively mobile.

Audiocinematography will do this. Many of the theatres in suburban districts and agricultural areas have followed directly in the footsteps of large cities by installing workable sound equipment with daily change of program. A short "fill-in" topic relating to public health would serve very well as an effort to save part of the billion dollars wasted annually on illness and suffering.

This medium will reach the class of persons who most need this service. Too many others still believe that their children are "just naturally skinny" and "they just must have the children's diseases". Too many fail to utilize medical science soon enough to accomplish much good.

The child need not suffer from smallpox, diphtheria, typhoid fever, tuberculosis, and many other infectious diseases if parents will take advantage of the means of prevention. They must be informed that there are organized health departments under competent supervision which can be of definite aid to them from a standpoint of economy and humanity. They must learn of the services offered, of the illnesses preventable, and the efficiency of public health will be advanced to a considerably higher degree.

New Du Pont Film

"HYDROELECTRIC Power Production in the New South," the third of a series of engineering motion picture films, has recently been released by the Du Pont Company. It is a two-reel film showing the development of the hydroelectric project of the Carolina Power & Light Company in the Great Smoky Mountains of North Carolina.

It will be loaned, free of charge, in 35 or 16-millimeter size by the Motion Picture Bureau, E. I. Du Pont de Nemours & Company, Inc., Wilmington, Delaware.

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Pacific Coast Section, S. M. P. E., Plans Impressive Program

THAT the Pacific Coast section of the Society of Motion Picture Engineers, now numbering 73 members, will be an active factor in the motion picture industry on the California coast is indicated by the impressive program just announced by Chairman Peter Mole and Secretary-Treasurer G. F. Rackett.

An outstanding feature of the work planned is the desire and aim of the organization to meet the problems of the future and not wait until they are here. "We feel," say Mole and Rackett, "that our purpose should be to anticipate the problems of the future and be ready for them when they arrive."

The program for the year ahead deals with the following subjects as outlined in the society's announcement:

The scientific fundamentals of color.

The application of color to cinematographic photography with particular reference to those systems in most current use.

Further discussions and specifications on wide film.

The analysis of the function, operation and equipment of film laboratories with particular reference to the changes in operation and control occasioned by the commercial processing of 35mm sound film and the possible processing of sound film wider than 35mm.

The general subject of television is to be covered both from the standpoint of fundamentals and technical operation and its application and possible effect on the motion picture industry.

The much misunderstood subject of stereoscopic depth is to be gone into for the purpose of establishing what it really is—what has been done in the field of development—and the scientific limitations of future progress.

The meetings throughout the year covering the above program will be held at places suitable to the particular program and paper being presented.

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The American Cinematographer

Germany Leads the World in "Film Surgery"

GERMAN surgeons and physicians are far advanced in the use of motion pictures for medical educational purposes, according to Dr. Joseph B. De Lee, of the Chicago Lying-In Hospital. Dr. De Lee recently sailed on the Cunard Liner *Berengaria* to study German Medical Film Laboratory customs.

In sailing, Dr. De Lee said, "Motion pictures as an aid to physicians is not new in America but the Americans are not so far advanced as the Germans. The Germans have been using motion pictures for educational purposes for a long time, but Americans have been slow to wake up to the advantages of motion pictures in medicine. Now they are beginning to awaken and are rushing ahead.

"I have been using motion pictures for educational instruction in Northwestern University as well as in the hospital for a number of years, and now I have a complete laboratory of my own where I have my own photographer take pictures while I am making an operation."

Dr. De Lee's film laboratory is perhaps the most elaborately equipped plant of its kind and for its purpose in this country at the present time. He has two Bell & Howell Standard 35 mm. professional cameras, two 16 mm. Bell & Howell FILMOS, and a complete assortment of lenses for these cameras, as well as a very elaborately equipped laboratory for photographing animated model work and drawings, and a remarkable photographic lighting plant.

In the new Chicago Lying-In Hospital, which is now under construction, there will be another complete movie laboratory which Dr. De Lee is confident will greatly increase the hospital's efficiency as well as be a great aid in the development of medical science generally.

The Technical Service Division of the Bell & Howell Company has been co-operating with Dr. De Lee in every way possible so that new developments in the motion picture industry may be placed at his disposal. He will spend two months in England, France and Germany.

(Courtesy of Filmo Topics)

Stage Technique in Talkies

(Continued from Page 16)

higher frequencies a desirable pressure doubling occurs before the diaphragm when the instrument is in free air, whereas when it is near a large surface the low notes are similarly reinforced and the advantage of the high tones is lost. And of course chamber resonances usually favor the lower part of the range, which is desirable in musical pick-up but can be well dispensed with in speech reproduction.

When the exigencies of pick-up compel the resourceful sound expert to place a microphone in such a position—and this applies to prop pick-ups frequently enough to be worth noting—he attempts to simulate a free-air pick-up by resorting to electrical filters. Fig. 3 shows an example of this device. Here the 500-ohm output of a microphone is connected to an amplifier input which matches its impedance. Between the two a 0.25 henry choke, controlled by a resistance in series, has been connected. The coil has a reactance of about 150 ohms at 100 cycles, 1,500 ohms at 1,000 cycles, etc. Obviously any tubbiness in the output of the microphone, caused by unfavorable acoustic conditions in the pick-up, may be remedied, at least partially, by adjusting the resistance to a suitable value. With all the resistance out, practically everything below 100 cycles is eliminated, with considerable effect up to about 600 cycles. With all the resistance in, the effect of the shunt is negligible. Alternatively, the inductance alone, with its internal resistance, may be changed to secure the desired effect.

The sound engineer worth the name does a good many things like that with his inductances, capacities, resistances, and other gadgets. What with these toys, and his job of educating the directors and producers and, equally, being educated himself, he is kept busy. Sometimes he is not only busy, but unhappy. But he isn't bored.

New Swiss Company

Washington.—The Standard-Cine-Phono A-G. of Zurich has been incorporated in Switzerland, it is learned from the M. P. Division of the Department of Commerce. The new firm will deal in films, projection apparatus and sound equipment. Offices are in Zurich.

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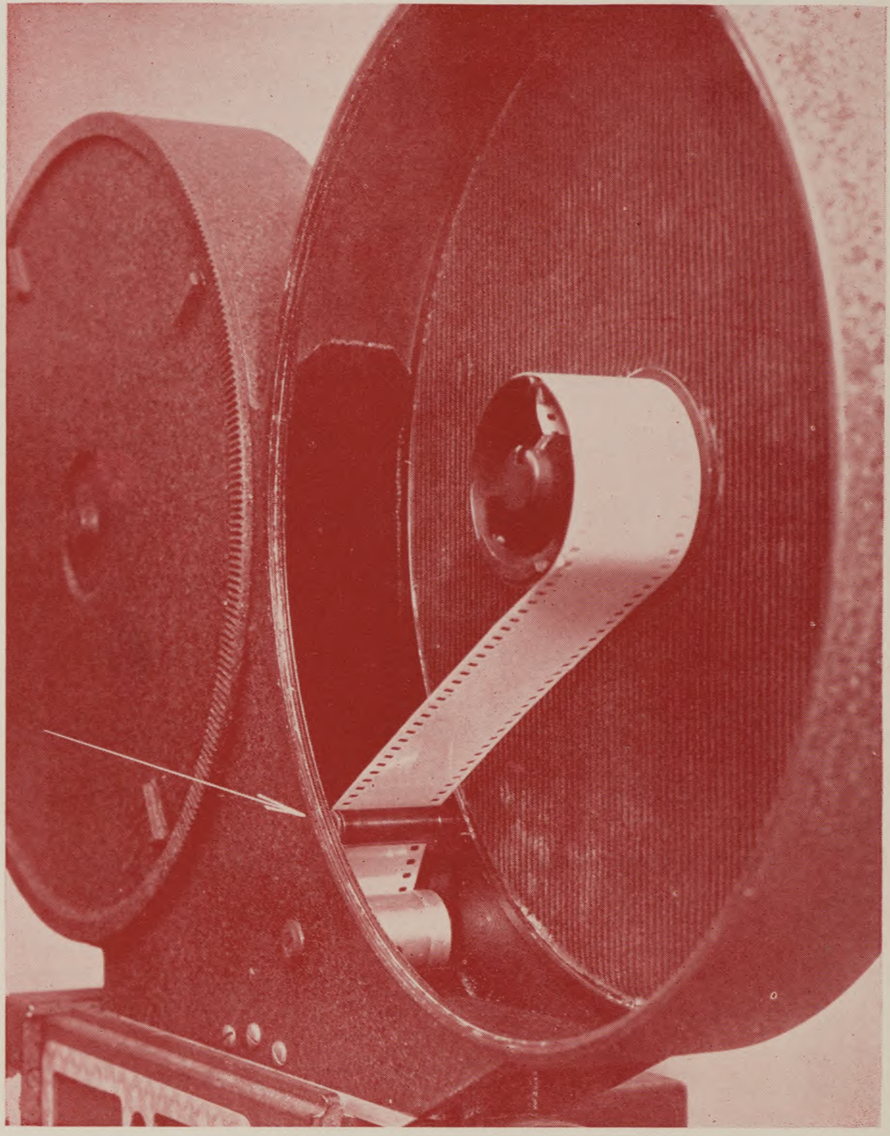

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